

DRAGON USER

International edition

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The independent Dragon magazine

Graphics
animation

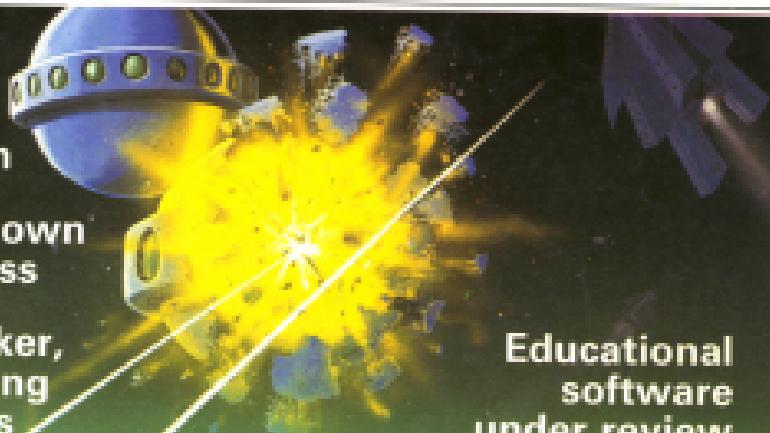
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to business

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Drag Racing
and Chess

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software
under review

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How to submit articles

The quality of the material we can publish in Dragon User must match well to a very great extent, depend on the quality of the discoveries you can make with your Dragon. The Dragon 30 computer manufactured in the market with a powerful version of BASIC, but with very poor documentation.

Everyone of us who uses a Dragon will be able to discover new links and quirks almost every day. To help other Dragon users keep up with the speed of the development each of us must assume that are made the discovery first — that means writing it down and passing it on to others.

Articles which are submitted to Dragon User for publication should not be more than 5000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, wherever possible, be computer printed on plain white paper and accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program featured you must include a stamped, addressed envelope.

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Including this month a professional tool at chess, Tabewriter improvements and additions to Connect 4.

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Mike Harrison plots the changes and variants in his review of educational software for the Dragon (the cover illustration is by Stuart Hughes)

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All you need to know to build an analogue-to-digital interface for your Dragon — including circuit diagrams and illustrations of connection methods

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This month's selection from the best of reader programs — including a chess game which allows pawn promotion and a screen routine generating random circles of all the colours available in high resolution

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Help is at hand — learn how to avoid the high resolution screen addressed, use the JUMP command properly, interface to the cassette socket and create delays with the TIMER function, along with advice on linking to the Sinclair printer

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A double chance to win a double prize — this month there's two sets of prizes to be won, each consisting of two different software modules. The prizes, from JDS Microsystems, are its sound and speech extension modules, plus an arcade game and utilities program

Editorial

FIRST THE BAD news: we've had to raise the cover price of Dragon User from 65p to 75p. The good news is that the subscription rate (use the card bound into the back of the magazine) is still the same — £38.00 for 12 issues mailed direct to you. But from the next issue onwards the subscription rate will have to go up — to £41.00 for 12 issues. So the message is subscribe now if you want to save £2.00.

But the savings don't end there, as a look at the contents of this issue will show you. We've had a lot of correspondence on educational and business software, so this month we're tackling both these subjects. Mike Harrison, a teacher himself, selects the best educational packages while we offer Ged Blaauw's Dragonshop, a simple maths game in which two children compete to be the first to spell the answer to sums displayed on the screen. To keep things lively there's also a reward — Ged thinks you have to programme an arcade-style game into Dragonshop so that the winner gets a few minutes of fun. On the business side Margaret Hannan's AddIt! shows you how to write a program which any small business will find useful; understanding how AddIt! works will also enable you to reach a better decision if you're considering buying a bigger business package to use in the office.

And for games players, there's Tracker, where you see if you can do British Rail a job any better — it's ideal for incorporating into Ged's Dragonshop. And if you want to improve your games programming, take a look at Dave Winder's introduction to the basics of animation. More advanced users have Pam D'Arcy's Topicscan to explore — this machine code program allows recovery from input/output errors giving faster tape positioning. And if it's hardware projects you're after, we show you how to build your own analogue-to-digital interface — complete with circuit diagrams and all the illustrations you need for the connections.

This is the variety we aim to offer in every issue — although our usual software reviews will be back next month looking at the latest games for the Dragon (and preparing for a Utilities special issue). We think Dragon User is a good buy even at 75p — but if you disagree, write and let us know what you think we should be doing.

Letters

A rhyme in time

HERE IS a political summary of Dragon User:
The man is Dragon User
For the computer that breathes
No,
Filled with all the smarts and
software
That an owner could desire.

It must have a problem page
For newsmen in the sport,
Interest for every age
And reviews of games where
Items are bought.

Ask for external contributions,
Only the best will the editor see
Try your hand! I expect it would
be same.
I did it and I know he doesn't
Always reflect.

Now for the readers' programs:
There's OpenBasic;
To see your work in print must
bring a smile.
And for the letters page I say give
a cheer
For without it this paper's work
wouldn't be here.

Mike Roy,
Editor

Golf loses handicap

MAY I, through your magazine, correct the many people who have written to me concerning my Golf program published in the July issue of Dragon User. I'm afraid there were one or two bugs in my original listing, for which I can only apologize and my sincere thanks by deleting the errors.

1. Line 2040 had got itself tagged on to the end of line 1040. It should of course be entered as a separate line.

2. Line 2040 should read ... OFP PINGPONG (BX, BY+1) = 3 THEN 2040

3. Line 2080 should read ... BY = PPOINT (BX, BY+1)

4. If the ball drops on the edge of the hole, it reads the hole as a water hazard. This is cured by adding line 2100 IF BY = 1 THEN 1880

5. The ball may occasionally disappear when it is in a bunker. The cure is to amend line 2100 by inserting PPOINT (BX, BY+1, LH) between

1040 and 2010

6. When the ball is on the green there are times when it and the figure are swapped around, apparently at random. Amend line 1880 by inserting IF BY = 1 AND Between IP AND SQN,

Finally, users without joysticks may like to try amending this listing. Delete line 1120 or 1150 (whichever is not used) and substitute:

1120 IF ... = PPOINT (BX, BY+1) = 220 THEN 1150

1150 FU = PPOINT (BX, BY+1) = 220

1160 IF PEAK (BX, BY) = 220 THEN

20 = BY+1: BY = 20

1200 IF PEAK (BX, BY) = 221 THEN

1800

1810 IF PEAK (BX, BY) = 222 THEN 1720

The figure will now move in response to the cursor control keys. Pressing the shift key will increase the distance moved at each step. The backspace is ignored by pressing and holding the space bar, and ended by releasing it.

Phil Brooks,
Comptroller,
Manufacturers.

Write on Microdeal

MAILED Particulaged 3 is Dragon software to use as a word processor after seeing an ad for Telesetter, I was most impressed to read John Scoville's article 'A look at the serious side of the Dragon'. The feature of writing out odd letters, caused problems in all word processing packages by the Dragon's way of scanning its keyboard, did originally slow down typing considerably, but in Microdeal to Microset their latest modification to the Telesetter program, only just issued, has improved things spectacularly and it is now possible to type quite fast.

I play it all the time, but found that the coding to ensure that there are no obvious moves for the computer to cover in a vertical direction were missing.

I remedied this by adding the following lines:

1041 A=BX+1 IF A > B THEN

1180

1143 IF GBT(A,A)-1 THEN

20=(A+1, GDT) 1142

1144 A=FB

1145 A=A-1 : IF A < 1 THEN

1146 THEN

1147 IF SV > 2 THEN

TB=SV-WB

1148 IF SV > 3 THEN

TB=(SV-WB)

One of many excellent features of Telesetter is the ease with which it enables one to access characters available on a printer but not on the Dragon's keyboard — particularly useful if, like me, you have to type a lot of stuff in foreign languages, with accents and capitals.

R. Huddart,
Jupiter 586

Hi-res input

If you want to input information while using the high resolution screen, then try the following:

100 A= -

110 PDISP 135,0

120 A = PIR (135):IF A = 1

THEN 120

130 IP = 13 THEN 130

140 A = A8 + RIGHTS

(1024\160),11:GDT 150

150 Now proceed with the

program using the input

information held in A8

If A variable is required then

make 150:A = RA,150

W. Peckin,
Widnes.

Adding to Connect 4

ONE OF the best games you have published in your magazine was Connect 4 in the October issue.

I play it all the time, but found that the coding to ensure that there are no obvious moves for the computer to cover in a vertical direction were missing.

I remedied this by adding the following lines:

1041 A=BX

1142 A=A+1 IF A > B THEN

1180

1143 IF GBT(A,A)-1 THEN

20=(A+1, GDT) 1142

1144 A=FB

1145 A=A-1 : IF A < 1 THEN

1146 THEN

1147 IF SV > 2 THEN

TB=SV-WB

1148 IF SV > 3 THEN

TB=(SV-WB)

This has greatly improved the program and makes the computer much harder to beat.

Just not cricket

I HAVE just purchased a Dragon 32 and with it Dragon Chess from Qdos Software — and I might add I am very pleased with both. But I am there is always a but isn't there? I cannot beat the computer.

Although at the moment I do not know much about programs I do know how to play chess. But when I get the computer on the run it calls a draw and stops the game — which isn't fair I cricket (I mean chess) is it? I like to finish my games even if losing.

The reason I have written to you is to ask if you or my readers can come up with something to overcome this situation.

Maurice Brown,
President,
Merrydale

QdosSoft like a professional feel to us. Either your Dragon is the best with artificial intelligence — or there's a fault in the software. Try writing to Basic Software, Lowest North St, Chelmsford, Essex. I think they should be able to help.

Atari interface

IN RESPONSE to your answer to Dragon Road in your December issue, there's no need to send off to the user for an interface connecting two Atari-type joysticks to the Dragon.

Dragon Computers can supply such an interface at £14.95. We also supply Woo's Famous Red Bell joystick at £14.95 and Trackball at £14.95. (Trackball does not need an adapter).

Dave Horner,
Dragon Computers,
8 Middle Row,
Chipping Norton,
Oxfordshire.

Software Top 10

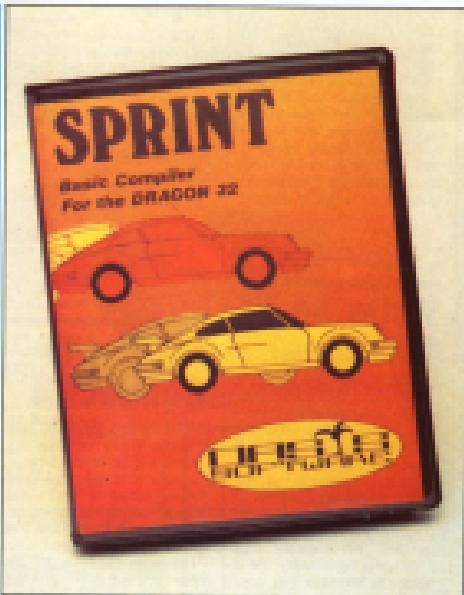
1. (C) Mixed OUT.....	Cooperative
2. (C) Paganine's Diary.....	Shareware
3. (-) Night Flight.....	Salomonster
4. (-) Ring of Darkness.....	Wintersoft
5. (H) Dragonfly Two.....	Hewson Consultants
6. (-) Gridrunner.....	Salomonster
7. (-) Champion.....	Pearsoft
8. (-) Lionheart.....	Microdeal
9. (-) Frogger.....	Microdeal
10. (-) Morocco Grand Prix.....	Microdeal

Chart compiled by Boots



Oasis Software present...

The first basic compiler for the DRAGON 32



Sprint compiles a subset of standard Dragon Basic which covers arrays, strings, local next loops, in fact virtually everything except floating point arithmetic and associated commands. All arithmetic is integer and the Dragon sound and graphic commands are fully supported.

SPRINT BASIC COMPILER

by Dr. David Gray
FOR THE DRAGON 32

The Technical aspect is based on the approach used in G.C.B.D. Pascal where the Basic program is first reduced to intermediate code and this is then converted using a run time package which is saved with the rest of the compiled programs.

- Programs will run 5—10 times faster.
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- Programs are compiled from tape under remote control so that much larger programs can be compiled.
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COMING SOON . . .

DRAGON PASCAL

Dragon Pascal is an extended integer subset of the structured programming language Pascal. A file of its many features include:

- A complete set of structured programming constructs.
- P, T, H-H, B, B-A, W-W, D, C-C, S, M
- (Q)DATA(B), (Q)DATA(M) simultaneous read/write for a rapid development cycle and total ease of use.
- Very rapid compilation. Source can actually be compiled more rapidly than it can be listed!
- Fully recursive.
- Standard compiler with sample programs including routines which demonstrate techniques for simulating floating point functions such as SQRT and COSINE.



DRAGON CHESS £9.95

- Six levels of play.
- All legal chess moves including en-passant, castling and pawn to queen promotion.
- List of previous moves stored which can be displayed or printed.
- Loading and saving of game positions from tape.
- High resolution graphics which can be flipped round to make black or white play from either end.
- Simultaneous text and graphics.
- Sticks can be exchanged at any stage.
- Best move hint.
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- Moves may be taken back and play resumed from any point.
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- Will adjudicate games between humans.
- Very high standard of play.
- Professional packaging and lifetime guarantee.

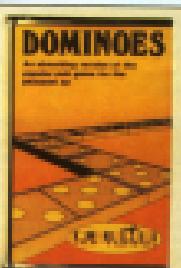
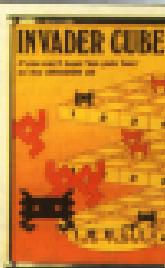
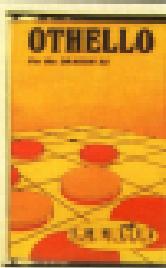
Dragonchess is without doubt the best value chess on the market today. MICRODEAL

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OTHELLO
£5.95

INVADER CUBE
£5.95

DOMINOES
£5.95



The excellent game of backgammon complete with full instructions and computer demonstration for beginners.

All last, Othello or Invader Cube is a must have board game. Dragon 32 offers all three of these, full instructions and computer demonstration for beginners.

As well as being one of the best games of skill available for the Dragon 32 it also has some of the best piece motion and graphics we have ever seen.

Two games in one with full instructions. Ideas of increasing play and progress has levels of play and the higher levels adapt to play to the assessment of your ability.

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£19.95

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OASIS SOFTWARE —

The Company that specialise in computer utilities.

Shards additions

NEW games continue to emerge from Shards, following its success with *Pettigrew's Diary* and *Empires*.

The company launched two games at the end of last year, *Hatched* and *Monster Maths*.

At £9.95, *Monster Maths* joins Shards' growing list of educational titles. It is a menu-driven mathematical cassette for 8-14-year-olds.

Hatched, on the other hand, is a hunting game presented in 16Kv graphics which involves catching and landing as many hatching chicks as you can.

Cotswold comms

COTSWOLD Computers can now supply software linking modems to established databases and existing interface communications with the outside world.

Cotswold already markets an RS232 interface at £99.95. Adding the software, written in machine code, will allow Basic commands to go straight out through the interface.

The package, including documentation and tape, costs £19.95, and was developed by software engineer Tony Richards of Richards Systems.

Tony is also interested in writing modern software, enabling links to be established to databases elsewhere. One example quoted is of linking to the European legal database.

Tony can be contacted by writing to Cotswold Computers, 8 Middle Row, Chipping Norton, Oxfordshire.

COMPUTER CLASS



"*Call of Duty* is one of the most popular software titles at your local computer centre."

Adventure fun plus turtles on the way

MORE adventures are on their way from Salamander — along with a Turtle graphics package.

Turtle Graphics costs £9.95 and will be released at the end of January. It has a comprehensive range of Turtle-type commands and a "huge menu".

You can design patterns, manipulate images, repeat shapes and achieve perspective effects by using string handling. The package is compatible with the Tandy four-colour printer plotter.

The two new adventures, due at the same time, are *Wings of War* and *The Crookwood Incident*. Each costs £7.95.

Wings of War is similar in style to the Dan Diamond trilogy. The story-line here is that you're parachuted into France and have to find your way through the resistance in a chase.

Crookwood Incident takes a more humorous approach to adventuring. You have a choice of six roles to adopt, ranging from Absolute Wally to John Travolta, as you



Salamander's Peter O'Connor - having fun in Cheltenham

search for the grail.

The game is based loosely on the Monty Python Holy Grail film, and has a similar sense of humour. Your opponents include Hells Chameleons and a host of Festus' Major cans.

Peter O'Connor, Salamander's projects director, said that the humour made the game particularly attractive.

"There's not many adventures around which are actually amusing while you're playing them," he explained.

Part of Peter's work involves assessing programs sent in by Dragon users. "Some are worth developing," he says, "but it would make my life a lot easier if I was sent in the others and maybe as well."

Microdeal racks them up

MICRODEAL went into the New Year with more than 30 software titles under its belt, and a range of new releases are being planned for this Easter.

The most recent games from the company are all aimed at arcade fans — with the exception of two simulations, *Pinball* and *Eight Ball* (a version of Pool).

The arcade titles include *Space Raiders*, which is "a much, much better version of Space Invaders", and two games from US author Ken Kalan, whose past successes include *Caithness in the Jungle* and *Imhotep's Revenge*.

New from him are the 3D game *Danger Ranger*, and *Devil Assault* which has three different screens and five levels of play.

Microdeal's list of use-

written programs is also increasing. Dave Thacker, who wrote *Guthben* goes *Dragon Hawk*; Rick Rayman has written a radiation version of Star Trek called *Space Fighter*; and *Skateboard*, with five different screens, comes from Steve Beck, who wrote two earlier *Guthben* titles.

Each game costs £8.00. The price goes up to £11.95 for the more serious programs such as *Job Recruit*, *Rainbow Writer*, *Teleforth* (which includes a tutorial and a fourth screen editor) and *Forwards* (a strangely spelled title with a familiar application — databases).

Rainbow Writer is similar in concept to the word processing package *Telewriter*. It offers lower case, but this time for normal Basic. It also fea-

tures you to define your own alphabet for such things as foreign languages.

Microdeal's John Symes added that "a lot of other programs are on their way for the Dragon" — probably towards Easter.

The company will have larger stands at this year's PCW and Earth Court shows enabling users to try out programmes — "possibly 20 more" at each.

Being worked on at the moment is a disk adventure with graphics, while a *Caithness* follow-up, *Caithness in the Mines*, is planned for February.

Microdeal is also starting a *Caithness Club*. Membership fee (£10) forms are included with each game cassette and entitles you to a quarterly newsletter featuring high scores, programming tips, etc.

Welcome to Dragon World

THE *Skip Praes* newsletter from Dragon Data has grown in size and changed its name to *Dragon World*.

The first issue came out in December, taking over from issue 6 of the newsletter. Subsequent issues will be published once every two months.

There's 16 pages in December's *Dragon World* and Es-

ton Data expects the February issue to be bigger.

The magazine is mailed out free to users who have returned their warranty cards.

The address for contacting the new magazine is Dragon World, Dragon Data, Kestig Industrial Estate, Maesgwn, Port Talbot, West Glamorgan.

The contents of the first issue are similar to *Skip Praes* — with a meeting column, young user pages, readers' letters and a selection of programs.

Additional features are a technical advice column and user club news.

ITL ponders 3 inch Dragon disk drives

ITL HOPES to produce an interface for its Byte Drive 800 three inch disk drive which will make it compatible with the Dragon, despite problems with one of the Dragon's interface chips which may necessitate a redesign.

The 3 inch disk format is said to offer more "bytes per platter" than the more common 5½ inch type, and may well become the small business market leader after a full range of applications software is available.

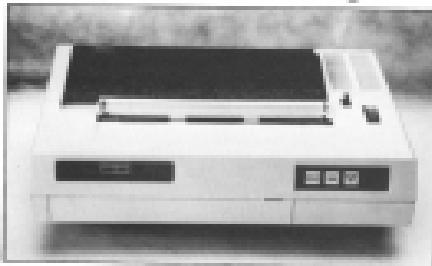
ITL's Tom Boyle commented that the potential of the Dragon was such that it would be unfortunate if the technical problems involved could not be overcome.

Then the Byte Drive 800 could compete with the two Dragon disk drives already available, from Dragon Data and Cumbria. Both expected to take three inch drives with one megabyte capacity being available.

Work on the cable interface for the Dragon, which should cost around £100 with the disk drive and manual, should begin once ITL has finished developing Sinclair Spectrum and Commodore 64 versions.

A full range of software, including assembly language assemblers, text editors, spreadsheets and databases, as well as presentation, ITL also hopes to release several popular games available on three inch disks.

Pick a printer from Tandy



Tandy's CGP-100 - seven colours for £149

MORE Tandy 10 Dragon-compatible printers are now available from Tandy — ranging in price from under £130 to over £1,000.

The TP-10 Thermal Printer is the cheapest, at £19.95. It prints at 200 characters a second on A4inch wide thermal paper which costs £2.40 a roll. This is the only printer in the range requiring special paper.

The CGP-110 four-colour printer plotter at £149 is already well-known. More recent is the CGP-220 which adds another three colours (yellow, violet and magenta) and increases the print speed to 40 characters a second in fast mode.

These printers are said to be ideal for line drawing. Worth considering for line and letter

quality printing is the CGP-110 at £289. This is a 9 inch wide printer with word and data processing modes.

Print speed is 60 characters a second — or 20 for word processing. For better quality look at the £699 CGP-210 which prints at 18 characters a second.

Higher up the range is the £899 CGP-420 which Tandy describes as "excellent for the small business user with big throughput". The company expects the market for such printers to rise as the CGP-8 operating system takes off.

Fairly up the range is the CGP-100 dot matrix model which prints at 140 characters a second.

Top of the range is a daisy-wheel model at £1,399.

First games for the 64

PHOENIX Software is one of the first companies to take advantage of the Dragon 64, offering a package aimed at adventure and arcade fans alike.

The Emperor Must Die is a twin-cassette package released this month at £3.99 — one cassette features an adventure and the other arcade action.

The story line is that the emperor of the galaxy is captured and you are chosen to assassinate him, assuming that you can pass the tests set along the way.

These tests present themselves in the form of three



Phoenix's Gary Rose

"tests" in the action cassette using 22 kb of memory! and two to the adventure plus one brief visit (using 48K).

The Emperor Must Die is Phoenix's first offering for the 64. Previous software from the company, set up last year by Gary Rose, also featured the twin-cassette concept, but was for the 32 and 64.

You begin with the action cassette, a space plane where you have to reach a randomly arranged sequence of control keys on different planets.

Reaching a third tower gives you the running code for the first adventure, set on an unknown planet where you have to survive against the native inhabitants, wild animals and an unfriendly tongue.

Surviving gives you the

locations of the first five control towers on the action tape and the correct order for reaching them.

Doing this successfully gives you the running code for the second side of the adventure — in which you recruit personnel and buy equipment to build a rocket capable of defeating the emperor.

Success here takes you back to the second five control towers on the action tape, collecting clues along the way for the third and final adventure. The final stage should then follow on the adventure planet with your assault mission attempt proving successful.

Just the thing for these long winter nights

EDUCATION 32

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1)

WHAT IS THE MISSING NUMBER?

4 7 10 13 -

An educated look at software

*Mike Harrison picks the educational dunces and wonkeys***ANSWER:**

<ENTER> TO PASS

<CLEAR> TO TERMINATE

DO YOU remember those heady days when you first got your Dragon? Now it was going to amuse, enthuse and educate your family. How poor financial and home management problems would be a thing of the past and children's learning be smoothed.

Well, think on. What how many clothes-line masters have you released, foggy snows you squashed and Kingjones passed? Compare this to the educational uses your computer has had. Up to now you've had the excuse of lack of inexpensive software. Is that true now? Every advert seems to sit in an educational tag or let's see if this excuse still holds up.

Speaking

Talking dragon, for example, is an ideal program to encourage children to learn those school spelling lists. You know, the ones they produce from their pockets for the first time ever breakfast on the day of the test itself. Schools all seem to set these tests but seldom advise on how soon they should be learnt. Help in the shape of this £3.95 Eurosoft tape is at hand.

The user creates a data file with careful input controls to ensure a good chance that words on the file are in fact spelled correctly and then helps the child make a voice-track on tape for each of the words.

Children can then test themselves using these audio tapes in their own account, at their own speed either immediately or at some time later by reloading the data. The strength of this program is also shown in error handling. It tells the user if he

responses is too short or contains too many letters and shows children the letters they've got in the right places so they can immediately make some attempt at correction.

The novelty value of the tape as it stands is a strong incentive to learning. The added graphical drawing capability in the version now on offer makes this a good educational program. It is not of course limited to learning spelling lists. I used it as a French/English vocabulary primer and it could be used in any circumstances calling for the Dragon's special ability to transmit sounds from tape to TV.

The Dragon 32 missed out on the Department of Industry micros in schools scheme, possibly because its font is only in capitals. Children's reading is always in lower case and although it is possible to change these in high resolution many educational programmes have missed this point, even when producing material for infants. It is ironic therefore that Galactic Hangman which is played entirely in halves and uses capitals, does on the screen. This cassette is also from Eurosoft and costs £7.95.

The unfortunate prisoner is saved from hanging if you can guess the word. In fact a noose-tight destroys the whole job in this event but what happens to the other inmates we never do find out. Quite good fun and in this no the data can be accessed, but it is severely educational. It doesn't teach anyone anything. It doesn't reinforce spelling or even teach tactics or strategy because the language is so full of

exceptions to contradictory rules. It has no role in developing language skills, as words need to be taught in the context of their meaning.

Silly Symys, the third in the Eurosoft series, does do just that job. In Silly Symys the importance of words is highlighted by the creation of funny stories much on the lines of Consequences, the party game. There are a number of basic storylines with players being asked to provide a plural, or adjective or nonsense word which is then inserted into an appropriate part of the story to manufacture ridiculous effects.

Many primary school children may have come across procedure exercises in school where every seventh word or so is a story in blanked out and from the context the user has to supply an appropriate word. "Hansel and John like _____ chocolate", might encourage replies like this, too, three or even. The basic story can be shown with the "gap" to be filled in Silly Symys and there is a creative mode where children can enter their own work which has been stimulated by the game. All options can be output to a printer. Silly Symys is £14.95 and 80 further stories ranging from Fairytale to X-rated (for adults only) are available.

Skills

Eurosoft's range of educational products also include Apps at £14.95 and Melody Express at £7.95. Apps is a Cass convertible interpreter which allows easy entry into assembly language programming. It

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- **new**, **powerful** **method** **allowing** **comparing**, **selecting** **and** **integrating** **data** **from** **multiple** **sources** **in** **one** **place**
- **higher** **standardization** **of** **data** **-** **minimizes** **bias** **and** **maximizes** **accuracy**
- **can** **analyze** **large** **amounts** **of** **data** **in** **a** **short** **time** **period** **and** **therefore** **analyze** **more** **data** **in** **a** **shorter** **time** **period**
- **can** **analyze** **data** **from** **multiple** **sources** **simultaneously** **and** **therefore** **analyze** **more** **data** **in** **a** **shorter** **time** **period**
- **but** **large** **amounts** **of** **data** **can** **be** **problematic** **and** **can** **lead** **to** **overload** **and** **confusion**
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TOOLKIT FOR DRAGON 32

+ BRAZOSCH Fig 10-107-01 base HORN DELTA + Suez Canal up to 10 times higher than BASIC. + LONGITUDE atmospheric flow over defined areas. + Width canals up to 10 times higher than BASIC for maximum wind speed. + BASIC and HORNDEL are the same. + HORNDEL = Suez Canal. Standard wind speed can be computed from static + POFTRAN input source code. Preliminary data (from BRAZOSCH).
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- many species of plants could spread from the tropics
as temperatures fall - 10-15 species already under threat
as temperatures rise
- but not climate can affect species:
 - temperature, precipitation and resource change
can all affect individual species
 - ecosystem changes can affect different species
in different ways
- many species are well adapted to climate change
- some species are not well adapted to climate change
- some species are well adapted to climate change but
climate modelling cannot predict

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ANSWER

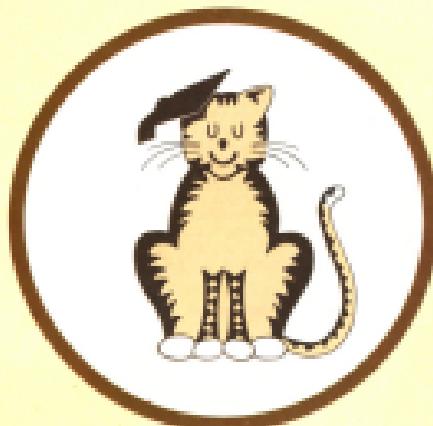


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• 4) for 'C' level computer science. Melody Express provides a simple introduction to keyboard skills as an introductory stage to visualised programming.

Tiger Software is another company which advertises "Educational Software — designed by experienced teachers". The Tiger IQ Test is beautifully drawn on the hi-res screen and looks for all the world like the exam paper it's meant to be. The test is timed and (a nice touch) the clock only activates when the full page is complete and ready for your answer. There is a good variety of questions such as:

WHAT IS THE NEXT NUMBER IN THE SERIES?

A 7 11 16 21 —
WHICH WORD IS THE SUFFIX?



as well as special questions giving an all-round test of this sort of reasoning for the kind of thinking the answers are 21 (and 1AT).

The CT 85 tape contains two 40-question tests. At the end of the test you're supposed IQ and an indication of your intellectual worth are announced. It's taken as a bit of fun, or even as a practice to give you an idea of what to expect in IQ tests (more commonly called verbal reasoning tests), this program is free but expensive. After all you can get paperbacks at £1.99 with dozens of tests in. Where I take issue with Tiger is in its use of the "Educational" tag of convenience — for this it certainly is not. An intelligence quotient is calculated with reference to a student's age. No respect for age is made. I refuse to believe that a 10-year-old and 30-year-old getting the same score on this test have the same IQ. Tiger's test says they do. In fact we are not told if this test is for primary children, 10 year olds or less executives (all properly constituted tests should have a target age range).

If you expect to get better at these tests by working from the answer page you can forget that too. For although you can compare your lot of answers to those of Tiger's this is in addition to the actual questions which you cannot recall except by taking the test again. Anyway without knowing the reason for the "correct" answers no learning can take place at all.

Child-proofing

My final criticism of this tape applies to many others too, and concerns child-proofing. This means helping the user to show his knowledge and not make mistakes due to the computer's method of working. For example in the question

WHAT IS THE NEXT LETTER?

A C E G —
(b) H b i o J

some children typed in the letter 'I' which is correct reasoning but not the answer 'H' which was acceptable. It is easy to restrict

returns on a computer — so why not do it.

Child-proofing was also lacking on the CT 85 Tiger Based Pic which is a racing game for one or two players. The players are assigned cars which go around a circuit by moves dependent on the track of a disc and the answering of a general knowledge question. There are around 600 different questions in 100 discs, 50 suited for five different age ranges from seven to adult. Younger players get questions including simple maths and spelling, and adults need to know obscure items from books of records. As in the IQ test no attempt is made to teach anything and although general knowledge quizzes may be fun, to sell them under the guise of "education" is both misleading and potentially harmful to this market.

Not much better is the £9.95 Eduaid 1 from Gary Software. This takes the form of the TV quiz Winner Takes All, as it does. Still the risk of allowing players to teach their judgement by the size of their bets. It is well child-proofed but with questions like "Who was married to the bloke whose reign began in 1422?" we have perhaps gone beyond the age where this is necessary. At a time when children are learning to break state security codes and pull down information from thousands of miles away, it seems inevitable that these programs ask obscure and useless tests about mountain ranges, long dead rulers and 1000 year old inventions. This program even has a mistake, Islamabad does not exist (the town in Pakistan is Islamabad), and San Cristobal is not the capital of Cuba either.

General knowledge

Perhaps the computer, then, is not the best way of testing general knowledge as misunderstandings cannot be dealt with and multiple choice questions are open to guesswork. The type of test that the Dragon 32 is ideal for, however, has been exploited very nicely by Grasswood Home Computers, in its Teach Type. This CT 85 program aims to have you touch typing in 10 hours and shows the correct finger for each letter as it is introduced. Visual representation of accuracy and speed encourage you to look at the screen, not the keys as you type. Typing is such a useful skill for teenagers to have in the fields of computers, journalism, further education and clerical work that Grasswood deserves to succeed with this program. Those who are learning already may find the absence of home keys a little daunting (but will be relieved from ABDL-LKJ boredom). The Dragon keyboard being one of its stronger features over its rivals, Teach Type ought to be a winner.

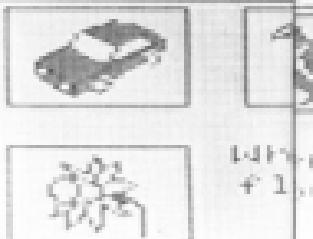
Tick Tock is a courageous attempt by the same company to design a program suitable to help reinforce time telling skills in young children. A friendly clock (looking not a little unlike the Big Ben's face) is drawn on the screen, and hours, half-hours and quarter-hours are displayed for children to read. The face rewards you with a wink and a smile when right. The display is colourful, chunky and appealing

IN WHAT COUNTIES SIERRA MADRE?

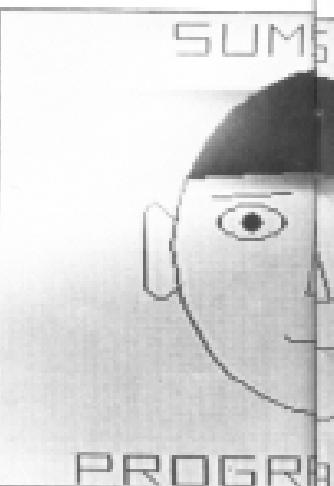
1	IRAQ
2	ROMANIA
3	CANADA
4	MEXICO
5	KENYA

NUMBER ?
SCORE 1 QUEST

Gary Software's Eduaid Geography



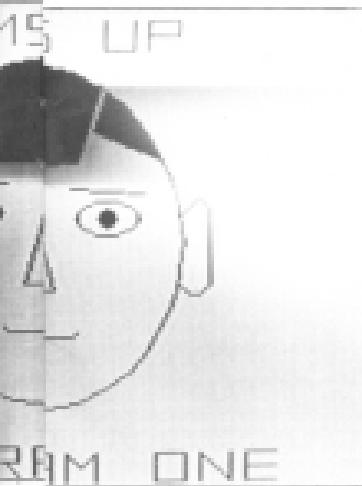
Dragon Data's Hole and Back



Same Up from Microsoft

1 - 1
2 - 1
3 - 1
4 - 1
5 - 1
6 - 1

STON 2 3 50

HOME IS TIME
1.GAME? ?

to children and the tickety tickety clock theme attractive.

The program has however, a few flaws. The key to successful time-telling is to distinguish between the long and short hands and to read the figures clearly. Making the hands different colours is not good enough. Adults (please) use interchanges. Tick and real clocks have hands the same colour. The eyes and mouth on the clock face are confusing and distract attention from the real action. Child eye makes 10 look like 18. When the child has made a mistake if it is not corrected and once a key has been hit it cannot be backspaced. The method of answering requires quarter past two to be entered by 2, colon, 1, 5 or it's wrong.

It is quite possible, if the real purpose of the tape is to teach time, for these difficulties to be overcome by re-programming, but interestingly what is needed is an experimental attitude to produce these tests. Why not allow children to put in some times and then make the clock show them? Tests could then be based on what the child himself had input in previously. Likely children up to six or seven have not learnt 6.45 or 3.30 but you talk about quarter-to and half-past. If revamped this little program could possibly be the friend of the teacher, and would be in demand in infant classrooms as well as at home.

Drowning

Baby Dragon (08 09, Iron Gravestones) contains two programs for young children. Both do not nothing more than any Dragon user could, generating sixteen numbers to be multiplied, divided, added and subtracted. All the action takes place on the text screen and no one has bothered to child-proof it. Letters are meant to be entered by mistake by young children and the consequent **REDO?** rips out part of the print or graphics. The program has to be run again if this happens or if blank or clear are touched. The object of the exercise seems to be to clean poor Baby (not very inspiring) but when this happens the water rises up against gravity to cover him. This is, of course, graphically easier than having him fall in but difficult to explain to an inquiring six-year-old.

Much better in presentation is the other program, *Teddy*. A number of honey pots need your help in bouncing past sleeping bears who in turn hope to catch some, and suddenly set up to do so. The honey graphics are very well drawn and the game is lots of fun for little children who only have to control the jumping by use of the space bar. I would say that three and four year olds would learn quite a bit trying to decide when to jump and if a score of successful escapes were displayed it would be a learning situation.

Unfortunately no scores are displayed for the program is yet another fail. The children are supposed to count the honey pots and record them back in again (National Curriculum for BBC was non-compliant?). However they won't be able to read the (incredibly only) questions nor is memory to keep adding on the pots to their running total to satisfy the examiner. So I'm afraid

it's thumbs down for Baby Dragon.

Many people who have recently purchased Baby Dragon from a large department store will be familiar with AmazeSoft's *Clockwise Count* Tutorial. A package for younger children in the same series is Maths 1. It is a very versatile program. Options (an difficulty level, display of playtime scores, changing the running order of exercises and the number of different questions per exercise all exist. Each of the 10 different exercises is introduced by a nursery rhyme and without reading is intended as the programmes assume that an adult is around to help out where necessary.

Kangaroos

The players names (drawn on title screen but unfortunately in capitals) act as a prompt for their answers. Only numerical answers are accepted and wrong answers are carefully chosen to be so. The program is geared to learning rather than just testing and is beautifully designed. Children are asked to count the bats bashed into a tree (**of Possum?**) by a kangaroo, and asked to make numbers of bats float into harbour in response to numbers shown. Sorting, mapping, sets and simple addition are included in these exercises, including a lovely one towards the end where children have to find the tallest and shortest in a line of flowers.

The package comes with two complete tapes (both double recorded) in a large plastic folder with some documentation. Unfortunately, for security reasons, the programs load additional data when running as breaking the program means the tedious process of reloading. However, Maths 1 will certainly give young children a good start in practising simple numbers before they start school and despite its £19.95 price is good value for money.

Older children need practice in tables and numbers too and Allyn Software has here £7.95 programs to provide it. *Sum 1* starts with a menu option for the four rules of number and a comprehensive set of instructions. The sums are presented in rows and there is graphic representation of score and time left. The slowness of the music means that keyboard responses against the clock become difficult. To enter 44 the sequence 4, 4, <ENTER> is too fast and is registered as 4, <CTRL & R> and mapped wrong. Click the slow down and get the hang of it if you can overcome this.

By the time Allyn Software produced *Sum 2* it had learned the lesson of lower case and presents seven pages of instructions in a style most children will be able to read. This is ironic as the subject matter — manipulation of fractions — is suitable only for children five years older than those for whom *Sum 1* might be useful. Wrong answers are erased and the method for gaining the right one shown. Perhaps future programmers would bear in mind that the computer needs itself easily to showing addition and subtractions of fractions in pictures (of cakes for example), and incorporate this in their programs.

However, it is a puzzle to me why anyone wants children to drag up

• their minds with ways for finding ½ of 2½, especially when we have machines as cheap as calculators to do it for us. No one expects us to do without our calculators and learn to cut the grass by hand, or to learn how to put two sticks together to reach the Sunday point. I've been perfectly able to manipulate fractions for 25 years but still am waiting for it to be put to some use. However some schools do still require pupils to learn these things and if your son or daughter is having difficulty then maybe *Smart 2* might be the answer.

Circus

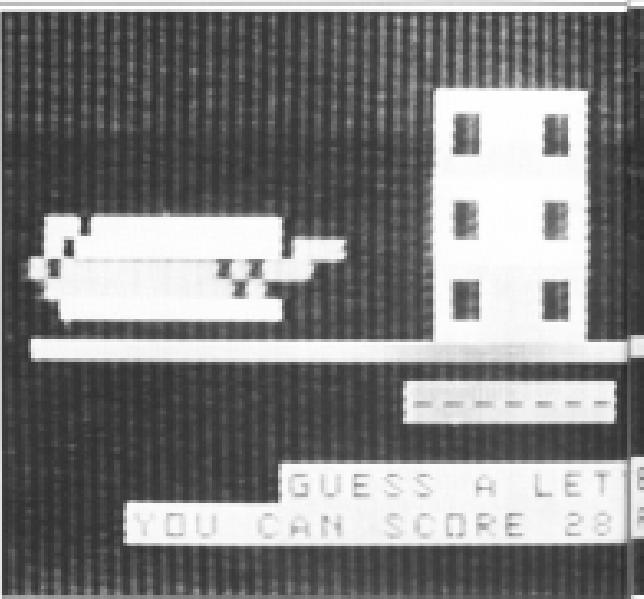
Of course, there is much to learn about computers, and the way they work apart from using them to reinforce school work. *Circus Adventure* (Dragon Data £7.99) sets out with the aim of doing just that job for primary school age, incorporating a number of user inputs "to encourage familiarisation with the keyboard" and presenting the child "with a series of choices to be made". The child who is lost somewhere in the circus has to try to find the popcorn stand. Dragon Data adds that "the average playing time is between 10 to 15 minutes", but I couldn't find anyone to persevere that long with such a boring game.

An adventure game, of necessity, should allow the player to reason out some of the moves or at least get the "you're getting warmer" stage. No such luck with *Circus Adventure*. Educationally it is a disaster for it expects children to opt for left and right, north or south without giving any indication of what such concepts mean. The choices it provides are without consequence and meaning. It asks do you want to go UP or DOWN (presumably underground), and informs UP as a mistake for it only wants the first letter. Now every Dragon owner knows that in this case you would use a restricted INPUT \$ or use a LEFT \$ routine after input but such subtleties are beyond *Circus Adventure*.

There is no logic in the game plan either. Starting at the entrance and going east leads you to the Tiger's cage, UP (suspended!) is the ticket booth; go right, down and north and you are back at the entrance. The only place this is true is at the north gate. Needless to say this programme for young children is entirely in test-bedstuffs.

This game bears no comparison to *Quest*, another Dragon Data adventure. *Quest* has no pretensions to be educational yet the consequences of moving N, E, S or W are shown on the map. It involves tracking and bargaining, the tactics of building up suitable forces and equipment and strategic planning. It has intermediate rewards and is a much better way of introducing adventure games and "computer literacy". So my advice is to leave *Circus Adventure* in the monkeys.

Holy and Geek from the same stable is an excellent machine code program written by Applied Systems Knowledge. It uses the full potential of the Dragon's graphical capacities. It consists of a mixture of maze and seek-type games



Shane Software's Fun in Laser - runs in MSX and offers five games

of the Kim's Game variety. It firstly familiarises children with the objects to be hidden, encourages matching skills and short term memory, and at the end the association of words with the pictures of the objects they represent. Some important pre-reading skills are incorporated in this superb program which is completely in high resolution colour and uses lower case letters throughout.

Value

There are two programs in the package taking over five minutes to load. 26 very good clear detailed pictures are shown and a small dictionary is supplied to look up spellings for the final image. A very nice touch is the use of on-screen symbols to prompt the need for the space bar or re-entry of a word. You can also return to the menu at any time during any six games. Super value for money at £11.95.

MazeCat's Testbed (£2.99) is the most expensive of this batch of software. It is packaged in a large ring file with two tapes and pages of detailed documentation.

The first program has similar characteristics to *Talking Speller* (reviewed earlier) except that the time for words to be put onto tape can be varied from between three and 26 seconds per word. Hence sentences showing the word in a sentence could be spoken. You can also get a print-out of results. In other respects this version is not as good as *Bearsoft's*. You get only one chance of each input (although you can offer words when list has been completed); all answers are accepted and incorrect ones are listed



Intell Pack from Shane Software against the true versions at the end of the test.

Word Drill consists of a series of multiple choice questions in which students are asked to find a word to match definitions. The words and definitions may be added and a data file created or taken from a demo file provided with the package. You could of course use files to build yourself an chemical formulae or make up a geo-



can be entered to build up the sum — but when wrong no attempt is made to analyse why a wrong answer has been reached. In fact when the correct product is printed the figures do not appear in the right columns. A *bottleneck* therefore is offered. It is a glimpse at a *Home Tape* consisting of a circle line and two dots, the sort of thing you will have first shown on the hi-res screen when learning.

The fourth program is *Estimate* which asks a difficult sum and then tells you how far out your guess was.

This set of programs was put together by Tom Mix, the Donkey King man and goes to show just how far behind educational software is compared to games. None of the ingenuity which goes to make up an arcade game (a variety of screens, come-again, motivation, test section and ample sound) is present in this package. It is just dull and stale drill and practice. In fact it is the opposite to what people in education and computing hope for from professional programmers. At this price it is abysmal.

Micro Debug Consultancy's Tables Tutor at £4.95 follows the same pattern of random number generation that we have seen before. It is childproofed in as much that the *check* key has been disabled but your answers can be letters or spurious symbols and these are accepted. In all this is an uninteresting program. Children would soon find it boring and it wasn't quite tough enough at displaying question after question to be a real test of tables and skill.

Shards Software has four educational programs ranging from £3.95 to £9.95. *Junior Pack* purports to teach simple counting and letter recognition skills. In the first program 11 dull looking, unevenly spaced green bottles appear on the screen and are removed one at a time to the accompaniment of that awful tune. You are then asked '10' times how many bottles remain on the screen (written in capitals), the numbers being from 1 to 9. The reward for reaching 10 correct answers is... much like a nightmare the screen filling ellipsis which seem to fill into a rusty brown. The reward is best avoided.

On the block.

The second program, *Alphabets* is by far the most appealing educational program I have even come across. It is supposed to teach letter recognition but draws unsightly blocky shaped shapes on the screen pointing to be words. The letters drawn on the screen do not join up at the bottom, the middle (only on capital E in these times as thick as long ones), and peculiar square shapes appear in the middle of blocked letters. The words themselves have very uneven spaces between their constituent letters and the pictures drawn on the screen to accompany the words are little short of pathetic. To cap it all the test at the end doesn't deal with letter recognition at all but asks questions on alphabetical order. It would do the credibility of Shards as a publisher of serious educational software much good if it withdrew this tape from the market immediately.

Junior Pack is a better proposition containing probably the best letter-tester of those on review. You play against the clock and the questions get harder or easier according to your abilities. The accompanying program is more dubious in worth. It is supposed to encourage word recognition skills but the sentences have a random element, eg "Dave is a strange man. He is a cow" and leave a lot to be desired.

Fun to Learn runs to 18K and is aimed at teaching and reinforcing simple skills in an attractive and entertaining way. Menu driven, the program consists of five games dealing with initial counting, anagrams, simple addition, a hangman type game and a series of exercises which encourage word attack skills through codes. This forms a useful package and should do well at £6.95.

Compendium

Live and Learn is a compendium of programs suitable for juniors and early secondary age children. The first program, *Graphers* takes you step by step through Dragon's high resolution graphics giving examples of each command and using them to create a picture on the screen. You can advance and recede at your own pace. It is disappointing that this is "view only" instruction, so interaction is allowed. It would have been possible to have let the student choose such things as the position of the drawing, the colour of the screen and the size (within limits). This would have been more of a learning experience.

Zoo is a good animal knowledge program. It contains information on 20 animals and for each one a hi-res map can be called on to show its world-wide distribution. There is a "guess the animal" option — you have to be able to spell the names correctly for the computer to recognise your answer.

With Britain the self-driven map looked me into high expectations but all it had to offer in the end was a list of the characteristics of countless towns in England, Wales, and Scotland. It offers a good example of the abuse of the sound function. Imagine 30 or 40 pages of text and each letter accompanied by a piercing bleep. I tell you I had been dragged around Britain by the ears.

Live and Learn ends with *Survivor* which is an interesting and safe method of testing your chances of desert survival than the real thing — and *Maze* which consists of a simple tutorial followed by your chance to do a *Yangsai* on the Dragon keyboard.

So how does your excuse of the lack of educational software hold up now? I have looked at some useful programs, some mediocre and a few good ones. Is any of them suit your needs and how did you choose? Any serious educational publisher should produce some documentation to go with the software. Schools often select packages by sending first for this literature. They can then make some judgment on its value and decide if it suits their needs. Perhaps parents with home computers should do the same thing. ■

★ DRAGON HARDWARE/SOFTWARE ★

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Putting some snap into learning maths

Ced Mead shows you how you can encourage your children to learn their times tables - and have some fun into the bargain

HOME COMPUTERS can be great fun for playing games, but many people buy a machine to use it, among other things, as a teaching aid. It is quite a convincing reason in those early days when you are trying to convince your wife, friends or even yourself that you have made a worthwhile investment.

Your micro does have the potential to make learning fun for children, but unfortunately most of the things in magazines and books are for games. Consequently it can be quite difficult to take advantage of this useful feature of your computer without guidance. This article should help the less-experienced programmer — it shows how to construct a simple maths game in which two children compete to be the first to spot the correct answer to sums displayed on the screen.

Starting ...

Type in the lines of the program listed with the asterisk in the order they are discussed here. To help you, the various sections of lines are addressed to show where you should add them to your listing.

Start with lines 40-60 which identify the names of the players and give them their instructions. Line 60 uses the RND#5 function to keep the instructions on screen until the player are ready to move on. As soon as C has a value (line 60), when any key is pressed the program can move on to the next line.

Line 110 generates the sums to be answered. The variable A will have a value between 3 and 12. "A=RND(100)-2" can be thought of as "pick a number from 1 to 10, then add 2 to it", so the range will be from 3 (ie, 1+2) to 12 (10+2). Similarly, B will vary between 4 and 12. C is the result of multiplying A and B.

To produce an "answer" to tempt our young players with, we use the usual statement in line 170 which might need a little explanation. Let us assume, for example, that A=9 and B=6. In which case C will of course be 54. Now if you think of "D=RND(100)-2" as meaning "Take a number between 1 and 91, 2 or 3, add the value of C to it" (making 56, 58

or 57 in our example), then take away 2 from this total, you will see that the three possible numbers produced are either 53, 54 or 55. This will work for any value of C that our program generates, producing a number which is equal to, one less or one more than C itself.

Line 180 now puts the question, 100 builds in a variable (points) and 180 points the "answer" offered, together with a sound prompt to draw attention to it.

Once the "answer" is on the screen we expect the players to react by pressing a key if the correct answer is being shown. To keep competitiveness and interest at a maximum we'll construct our program so that if both children press their key then both players will be recorded and suitable messages displayed. The quicker child will still win, but the slower one will also earn points if the right key presses are made.

To achieve this, we have to adapt the RND#5 function to suit our purposes. The standard IFNEXT#5 statement (eg B\$=IFNEXT#5) alone will only record the value of the last key pressed — and would actually identify the second player as the winner! So we will employ a string array in which we can store the various key presses made. When a key is depressed, its value (which should be the letter "A" or "L" if the players have followed their instructions) will be stored in the array B\$(0). By this method, the first key press can be stored in B\$(0) and the second in B\$(1), so we can easily evaluate who was the fastest.

From lines 200-240 Line 200 sets up the IFNEXT function, and line 210 a FOR...NEXT loop which effectively scans the keyboard up to 100 times. The first statement in line 220 introduces the string array and means "when a key is pressed, store its value in the next subscript of the array B\$". Until a key is pressed, J will equal 0, so the first key press will be stored in B\$(0). In order to keep the program circling through our FOR...NEXT loop if no key has been pressed, we add the second statement in 220 which reads as "If no letter is yet stored in the current subscript of B\$(0) then

go directly to line 240", from where the loop will restart.

If, on the other hand, a key has been pressed since the last time the IFNEXT checked the keyboard then B\$(J) will have a value (the letter pressed) and will NOT equal "-". It will therefore ignore the IF...THEN statement and chop through to line 230.

If line 230 is reached it must be because B\$(J) has a value stored in it. As this subscript is now "occupied" we add 1 to the value of J so that the next key press reading can be put into B\$(J). The second statement in this line simply ensures that once two keys have been pressed the program will jump out of the FOR...NEXT loop, moving the game into the next stage.

Line 250 will only be reached if J=0 (no keys pressed during the whole run of the FOR...NEXT loop) or J=1 (only one key pressed). If J does equal 1 the program jumps to line 300. If J=0 then line 260 will assess whether keys have been pressed or not. If the answer offered on screen was not the right one the program moves to line 260, gives a short prompt then goes back to line 120 to start the sequence again with a new value for D. If the right answer was displayed (ie, D=C) then line 270 points out the missed opportunity to our key-banging mathematicians. Line 280 pauses, then sends control back to line 100 from where a new series of variables are created.

... block

The next block of lines from 300-480 cover the permutations when only one key has been pressed. Lines 310-370 apply if the right answer was displayed and will congratulate the quick-reactor player who pressed, then go to the appropriate subroutine in lines 380-440 which keep score. If neither "A" nor "L" were pressed then this is picked up in line 370 and line 380 prints a message accordingly. In all cases, the program then goes back to lines 260 and 100 to restart the sequence.

Lines 400-450 point out the error of his ways to a player pressing when he ■

• 4) *Alcachofra*, *Brócoli* and *Bacalhau* (salted cod). If they have eaten all 3, then we should switch to dinner at 5pm.

Lions 480-600 come into play when two keys have been pressed (clock back to time 200 if you are unsure about this). First of all we have to discourage the train from those he might try and get extra points by pressing his own key before us in-exclude the other player. This is done by Lions 600 to 800 which set the power-ups invincibles and then increase the other players 600's. Lions 800-900 reflects if the player pressed his own button "one one".

Dinner has been checked out, lines 300-310 sort through the contents of 300 to decide who was first the player whose file is found in 300, section 300(1) and whether any other keys apart from those mentioned were pressed. Although lines 300-310 may seem complex at first, if you have stayed with me so far and understood how the earlier lines 300-450 did their job, you should have little difficulty seeing how this section carries on its tasks too. Lines 300-360 analyse the test menu and 360-370 removes the cursor.

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players pressed when they shouldn't have. In this case it doesn't really matter who pressed first as both players did penalized equally, but let's say I have this information now, may as well display it on screen? Lines 1680 and 1702 control if you would key was pressed.

Loose ends

Now to tidy up a few loose ends. Line 30 resets the scores to zero at start of play. Line 1020 ensures that the array `BS` is empty before each new display is made (it was last filled by the `display` made during one display might be read as a very fast press on the keys). Line 1030 checks the scores and jumps to the "winner" sequence if either player has reached 25 points.

The sections we have covered so far are the backbone of the program. The remaining lines add some sound and action. Line 700 is a simple screen display of the players names and scores. Lines 760-780 (PWORD) is a set of extensions over Player 1's routine if the scores for the other players is personalized; and line 790 updates the score screen. Lines 800-810 are screen savers.

the other player. It has a 640x480 resolution and is distributed with a small toolbar and toolbar help.

Line 180 prevents the game from getting hung up on one sum by counting how many consecutive wrong answers are generated in line 170. It then ensures that by the fourth display the right answer will be offered. Line 190 results this counter logic.

Depending on the children involved, the pleasure of being the answer may be reward enough — but in my experience they won't last long and more enforcement may be necessary to keep them at it. One good way of achieving this is to let the answerer play a round or two of an appropriate game before the program reveals its question and answer routines. You can use any game program written in BASIC for this (try "Cracker", elsewhere in this issue).

an excellent device. Enter area 800-800. Fill in the name of the arcade game. The demand for the winner's name is really only a bit of showmanship for the winner and could easily be dispensed.

新規規制の影響

```

890 IF B8100=1L" THEN PRINT LF;GOSUB 720;GOTO200
900 GOSUB400
910 IF B8100=2L" THEN 420
920 PRINT"FIRST KEY PRESSED WAS... "
930 IF B8100=3L" THEN PRINT AT+1;GOSUB 720;GOTO200
940 IF B8100=4L" THEN PRINT AT+2;GOSUB 720;GOTO200
950 IF B8100=5L" THEN PRINT LF;P#+1;GOSUB 800;GOTO200
960 GOSUB 750
970 IF B811=1A" THEN PRINT 8004,AHE+E+1;GOSUB 720;GOTO10
980 IF B811=1L" THEN PRINT B811, LF;P#+1;GOSUB 800;GOTO10
990 PRINTB811,"SECOND KEY... ";GOTO 370
100 PRINTB811,"WAS THE SECOND TO PRESS";GOTO200
101 PRINT"YOU ARE BOTH WRONG"
102 IF B8101=1A" THEN PRINT A1;GOSUB 750;GOTO670
103 IF B8101=1L" THEN PRINT LF;GOSUB 750;GOTO670
104 GOSUB 750
105 PRINTB811,"AND SECOND PRESS WAS... "
106 IF B811=1A" THEN PRINTB811, AH;GOSUB 750;GOTD290
107 IF B811=1L" THEN PRINTB811, LF;GOSUB 750;GOTD290
700 GOSUB 750;GOTO290
701 SOUND 15.4;PRINT"WRONG KEY PRESSED";RETURN
702 FOR I=1000T
703 POKE 1024+I,42;SOUND 200,2
704 NEXT I
705 GOSUB 980;RETURN
706 FOR I=1000T
707 POKE 1024-1,42;SOUND 200,2
708 NEXT I
709 GOSUB 980;RETURN
710 FOR I=1000T
711 POKE 1024-1,42;SOUND 200,2
712 NEXT I
713 GOSUB 980;RETURN
714 CLS :PRINT"1"; -
715 FOR J=1TO10: SOUND 140,3;PRINT#1,J;"DECE A WINNER!! DECE";NEXT 2
716 PRINT#1,PRINT#1,PRINT#1,MID THE WINNER IS...,"1PRINT
717 PLAY "118V20248L2003030DFOCDFDC000L20"
718 IF C#<0 THEN PRINT AH,WHICH PRINT L4E4L4L
719 FOR K=1TO100:MENT K
720 CLS;PRINT"THE WINNER OF THIS ROUND";PRINT"HAS EARNED A GAME";PRINT"OF *****";
*****;PRINT"TYPE IN THE WINNER'S NAME TO";PRINT"START THE GAME - OR TYPE L
N H THE WORD 'QUIT' FOR ANOTHER GAME";PRINT"OF matched";PRINT
721 INPUT "NAME...";L$P
722 IF S#<0 THEN 1000 ELSE IF S#=>#1000" THEN 30 ELSE SOUND 10,7;GOTO 700
723 S#=>2;GOSUB700;RETURN
724 F#=>2;GOSUB 700;RETURN
725 S#=>1;GOSUB 700;RETURN
726 F#=>1;GOSUB 700;RETURN
727 PRINT#22,L$;PRINT#1000;J#;RETURN

```

- 1 SAVE "Mathman" onto a tape.
- 2 LOAD your chosen arcade game.
- 3 RUN the arcade game, making the first line number 1800 — see page 43 of Chapter Handbook.
- 4 SAVE the now renumbered arcade game on tape.
- 5 LOAD "Mathman".
- 6 Use the intermediate mode (ie, type in these instructions directly without line numbers). Then press "ENTER". The colon makes it clear that only — don't have them in — Type "PICK PEEK(25),PEEK(26)" and then press ENTER.
- 7 Make a note of the two numbers that appear on screen.
- 8 Type "POKE PEEK(26)" and ENTER.
- 9 If the noted number is greater than 1 then type "POKE 25, PEEK(27) : POKE 26, PEEK(28)-2". Otherwise type "POKE 25, PEEK(27)-1 : POKE 26, 256 : PEEK(28)".
- 10 LOAD the renumbered arcade game.
- 11 In the intermediate mode, type "POKE 25," and then type in the first number from instruction 6 : ENTER (say, Note here "POKE 26," and the second

If you have followed the above instructions,
exactly you will have merged the two

All that remains is for us to add the lines that will ensure that once our timer has had the allotted period on the arcade game the program will return to the maths game. This can be done in a number of ways and either you have:

Back to math

Finally, feed the line in the arcade game anyway that gives the player the choice of playing again. After this line to read the ROM "ANOTHER GAME" (11,0,23,8; 28-11, "THEIR FUNERAL BEGINS". Alternatively, use the TBLMIR function and insert an additional line in the multi-line sequence:

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Find a line in your arcade game which is often altered as the program runs. Use code that updates the score and inserts these key statements in it: `if (T11 > TMAX) : T11 = TMAX` and `T11 = TMAX THEN score = 0`. Finally, add new lines.

00000 CLS PRINT "TIME UP":FOR
K=1 TO 1000:NEXT:GOTO 30

It's always the following parties which do the following things:

```

163 S1=RMD(2) : IP S1=1 THEN
164 S2=RMD(3) : IP S2=1 THEN
    D=C-B : GOTO 180 ELSE IF S2=2
    THEN D=C+B : GOTO 180 ELSE

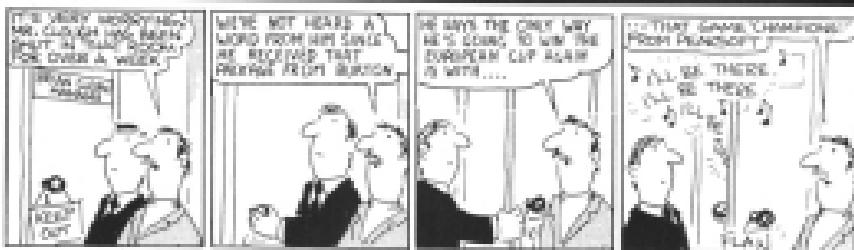
```

D-D: DTD-100
 which will randomly produce a different series of possible "transients". Increases display time (duration time) by increasing the number in line 270. To have a new name generated each display, change the last figure in line 280 from "100" to "1000". Alter display time of screen messages by changing the numbers in lines 280 and 290.

You have there the makings of a first-class competitive math game — it's open to you now to enhance it with sound and color, animation and variety. Remember the key key points for a successful educational program — happy & healthy math students are great citizens!

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Getting on the right track

By Richard Treadaway

Digitized by srujanika@gmail.com

THIS NEW game for the Dragon is written entirely in Basic but it's fast enough to simulate the feel of early keyboard games. It is compatible with both colour and black-and-white televisions.

Tracker is a game loosely based on a railfan's track board and evolved from a simulation-type program. The trackboard maintains the positions, speed of trains and the status of the junctions along each railway line. Nine trains are represented by their side and the railway lines as a grid system of yellow tracks. Your objective is to keep all the trains on the tracks for as long as possible.

A train moving towards a junction with a break in the track ahead implies the points are set against it and only the initial use of the arrow keys will present the pending closure. Points are closed by pressing the same key in the direction you wish the train not to travel. For example, there's a train moving down the screen with the points set against it, you press any arrow key other than up to stop a perpendicular

When an arrow key is pressed, the same graphic signature will pull its lever and the points reset. But just to make life difficult, each time one set of points are changed, all the others change in a similar manner. There are two dimensions, though, trains may accelerate and pass from opposite directions. I didn't want to make the game totally impossible.

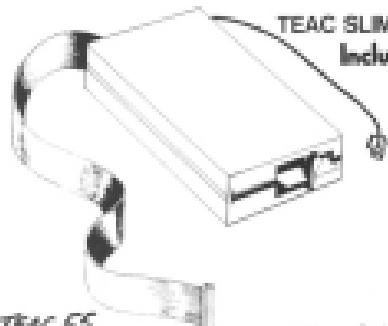
A record of time, in approximate seconds, is kept and constantly updated on the screen as well as the current best time (labeled BT).

The program begins with a beautiful Tracker logo display followed by a brief test of instructions. The user is prompted to select between two and six trains or opt for the demonstration mode. I suggest you select two trains of four until you are familiar with the method of selecting the points. In the computer demonstration mode the computer plays using five trains and seven loops, each of six cars long.

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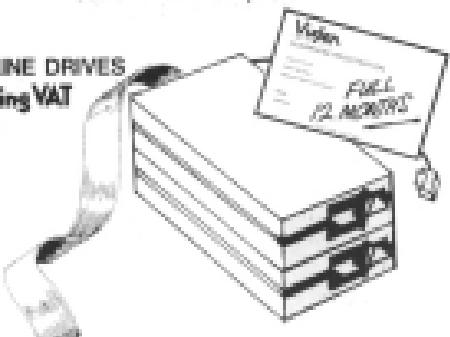


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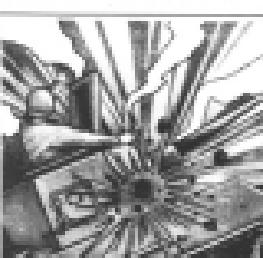
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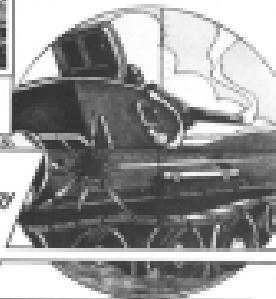


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Easy animation

MOST OF THE home micros available now are capable of some form of animation, the Dragon 32 being one of the leaders in the field. On all micros there are various ways of achieving animation, although the Dragon has more than most. In this article we will concentrate on two methods of obtaining movement.

The simplest way

The first of these is the simplest way possible — using the test screen. Although written for Dragon 32 machines, this set of programs should run on most computers, with only slight changes.

Let us start by displaying on screen the "star" of our epic:

```
10CLS  
20Y=8  
30PRINT Y,"."
```

If we now add the lines 40 Y=Y+1 and 50 GOTO 30 we have a line that flashes across the screen. By adding a space before the "Y" in line 30 we can blank out the last "Y" and give the illusion of movement (line 30 should now read 30 PRINT " "Y,"."). All this happens rather quickly, so let us rewrite our program to slow things down.

```
10CLS  
20FOR Y=1 TO 20  
30PRINT Y,"."  
40NEXT Y
```

The star's comeback

Our next problem is to bring our "Y" back again. This can be done with the lines:

```
50FOR Y=20 TO 1 STEP -1  
60PRINT Y,"."  
70NEXT Y  
80GOT0 30
```

Dave Whittle introduces the basics of animation for the Dragon and shows just how easy it can be

The program, as it stands, deals totally well with movement in the horizontal plane, so how about vertical movement? This is quite possible on the TEXT screen, a slightly more complicated. Using our original program, altered to read:

```
10CLS  
20FOR Y=440 TO 2 STEP -20  
30PRINT Y,"."  
40FOR X=1 TO 100 NEXT X  
50MIDT Y,GOTO 10
```

We have left off. However this time, our existing GOTOs will not work. So we have to find another means of removing the last "Y". Using CLS will work, of course. Try changing line 50 to 50:CLS:NEXT and we now have vertical movement. Using CLS is not much good, though, if you have anything else on the screen that you need to keep. Add the lines:

```
5:CLS:PRINT "200","gone"  
7:FOR B=1 TO 500:NEXT  
65:PRINT @204,"BLUR":  
for a demonstration of some of the problems. We need then to find another way of erasing our "Y". What we need to do is print a space immediately below the NEXT print position. In other words in the space occupied by our "Y" before the current cycle of the loop.
```

To do this we need to alter our program once more:

```
10CLS  
20FOR Y=440 TO 2 STEP -20  
30PRINT Y,"."  
40NEXT Y
```

```
40FOR X=1 TO 100:NEXT X  
50PRINT Y,"."  
60FOR X=1 TO 100:NEXT X  
70NEXT Y
```

Now we have achieved movement in both planes. Let us now finally rewrite the program to demonstrate a bit more graphically what we have learned.

```
10CLS:PRINT @204,"MODULE":  
20FOR Y=440 TO 1 STEP -20  
30PRINT @Y,".",SCREEN 90  
40PRINT @Y-1,".",SCREEN 90  
50NEXT Y  
60FOR Y=1 TO 30:NEXT Y  
70PRINT @Y-1,".",SCREEN 90  
80NEXT Y:GOTOS 10
```

As you can see from running the program it is not finished. Using the information contained in the earlier listings, see if you can complete the movement around the screen.

Method No. 2

Let us now look at another method of animation. This time we will use Dragon's excellent DRAW command.

The following program DRAWs a figure on the screen, clears it and then DRAWs a slightly different figure a few points forward. The program is quite simple and the following notes will help you to understand its workings.

Program notes

10-30	Sets MODE and SCREEN.
30-60	Creates STPRIMs TO DRAW figures.
60-80	Makes SOUND and controls DRAWings.
80-90	Loops back to start. ■

```
5:FORALL:CMDP#1:DAVE#NTMDLG#WUG#3:  
10:PRD004,1:SCREEN1,1:PCLS:DEM 9:  
20:(29,19)  
20:UTMELA(29,19) 30:Y=120  
40:R2="#3E69B2912U9L2U2R214U2L1R  
172R144R6,2603C585014L13H6C83P6L3=":  
40:L8="#3E69B2912R14L2U2R214T2L1R  
102R144R6L2D3F013014L13H6PRT06L3"  
60:R4="#3E69B2912U9L2U2R214U2L1R10  
284D4DL2501104L13H6P6L3"  
70:DRAW#R220,90°+14  
80:SOUNDS,1  
90:FOR B=1 TO 200:NEXT  
100:PCLS  
110:DRAW#R220,90°+B  
115:SOUNDS,1  
120:FORB=1 TO 200:NEXT  
130:PCLS  
140:DRAW#R220,90°+B  
145:SOUNDS,1  
150:FOR B=1 TO 200:NEXT  
160:PCLS
```

```
170:DRAW#R220,90°+14  
175:SOUNDS,1  
190:FORB=1 TO 200:NEXT:PCLS  
200:DRAW#R220,90°+B  
210:SOUNDS,1  
220:DRAW#R220,90°+B  
225:SOUNDS,1  
230:FORB=1 TO 200:NEXT:PCLS  
240:DRAW#R220,90°+B  
245:SOUNDS,1  
250:FORB=1 TO 200:NEXT:PCLS  
260:DRAW#R220,90°+B  
265:SOUNDS,1  
270:FORB=1 TO 200:NEXT:PCLS  
280:DRAW#R220,90°+B  
285:SOUNDS,1  
290:FORB=1 TO 200:NEXT:PCLS  
300:DRAW#R220,90°+B  
305:SOUNDS,1  
310:FORB=1 TO 200:NEXT:PCLS  
320:GOTOS 10
```

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TDD/TTD

Getting down to small business

There's more to the micro than playing games — Margaret Norman explains some of the methods and applications of data storage and manipulation

MOST HOME computer owners bought their micro in the belief that they would be able not only to play games on them, but also use them to keep track of their bank accounts, look after their files and so on. Here is a program which I hope will make it easier for you to do some of these things, by showing you how to store and manipulate data.

This program has been written to hold the names of a number of items, further brief descriptions (eg the category to which each belongs) and an associated numerical value. It can calculate the total numerical value of various numbers of different items for you. There are several possible applications for a program like this. It could be used to calculate the value of stock in a small shop, by entering the names of items stocked and their prices; or even to calculate the calorie content of a meal, by entering names of foods and their calorie values.

File structure

It could also be used just as a simple file, say, names, addresses and telephone numbers — you can just ignore the part of the program which performs the calculations, or remove it by deleting lines 280 and 5800 to 5950, changing the number 8 in lines 270 to 280 to 4, and erasing the number 5800 from line 380.

The first stage in writing such a program is to determine the structure of the file to be used, the number and type of data fields and the maximum number of records that can be handled. The number of records which can be held in memory at once obviously depends on the number of fields in each, the more fields, the less records you can have. The data is held in arrays. Here a string array is used for the first two fields, and a numeric array for the third. It would be possible to hold all the data in a single array, using the VAL function where calculations are to be performed, but if it is known that calculations will be required it is more efficient to use one numeric array.

Alphabetical order

If you are unsure how many records your file will need, you can find out by trial and error, put a fairly large number in the DATA statement at the start of the program, then keep adding data until you get an OME error. If that happens give you the number of records it took. If you do remember to end the DATA at regular intervals so you don't lose it all.

The records are arranged in alphabetical order by the sort routine in lines 2040 to 2120. A very simple sort has been used, which will place records in the file fastest if they are entered already in alphabetical

order. For data which is likely to be entered in a random order, a more complex sort routine, such as a binary sort, would be quicker. It would be a simple task to change the routine so that records are filed according to the numeric value rather than the name of the item — just change every occurrence of AB(X,1) in the section to AD(X).

Deciding options

Once you have structured the file, the next job is to decide which options you want to have available to the program user. Obviously you will need to be able to enter new data, to save the data on tape and to load it again (there is little point in having a file if you cannot later examine it). An option to delete entries is also fairly essential — here it has been combined with the examine data option. If your records are fairly long ones it may be desirable to include an option to alter the data in individual fields — here changes can only be made by deleting that re-entering a complete record. You may also want to be able to search for all the records containing a given string, use the INSTR function for this.

The option to load an existing file from tape is given at the beginning of the program, as this can only be done at the start. All other options are presented in ■

```
10 REM ADDFILE
20 REM BY MARGARET NORMAN
30 FCLEAR 1:CLPRINT 10000
40 DIM AB(400,20,41400)
50 CLS
60 PRINT#200,"ADDFILE"
70 FOR DL=0 TO 10000NEXT
100 CLS
110 INPUT"DO YOU WISH TO LOAD EXISTING DATA FILE FROM TAPE?":B$=IN
120 IF B$="" THEN 180
130 REM PRIN1 OPTD00
210 CLS
220 PRINT#33,"OPTIONS AVAILABLE: " ;PRINT
230 PRINT"1) ADD NEW DATA TO FILE"
240 PRINT"2) ERASING/DELETE DATA IN FILE"
250 PRINT"3) SAVE FILE ON TAPE"
260 PRINT"4) CALCULATION"
270 PRINT"5) EXIT"
280 PRINT#111"ENTER NO. BETWEEN 1 AND 5":OPT
290 IF OPT<1 OR OPT>5 THEN 280
300 DN OPT:GOTO 2000,3000,4000,5000,3500
350 CLS:PRINT#200,"GOODBYE":END
1000 REM LOAD FILE FROM TAPE
1000 CLS:PRINT"TAPE IS READY,PRESS 'ENTER'":INPUT D$
```

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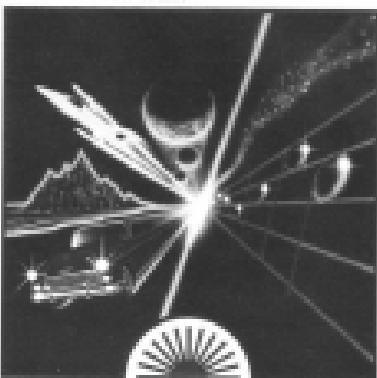


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```

3020 DIM#1",,0-1,"ADD"
3030 INPUT #1,N
3040 FOR I=1 TO N
3050 INPUT 0-1,A#1,I,11
3060 INPUT 0-1,A#1,I,21
3070 INPUT 0-1,A#1,I,31,M#1,I
3080 GOTO 200
3090 REM ADD DATA TO FILE
3100 IF N>400 THEN CLS,PRINT#0,"FILE IS FULL",FOR DL=0 TO 400,NEXT,DLTD 200
3110 CLS,INPUT#NME OF ITEM",A#1,I,11
3120 INPUT "DESCRIPTION",A#1,I,21
3130 INPUT "VALUE",A#1,I,31
3140 IF N>0 THEN 2120
3150 FOR I=N TO 1 STEP -1
3160 IF A#1,I,31=M#1,I,31 THEN 2120
3170 A#1,I,31=A#1,I,31+1,A#1,I,31=A#1,I,31+1,A#1,I,31+1
3180 M#1,I,31=M#1,I,31+1,A#1,I,31=A#1,I,31+1,M#1,I,31+1
3190 A#1,I,31=A#1,I,31+1,A#1,I,31=A#1,I,31+1,M#1,I,31+1=M#1,I,31+1
3200 NEXT I
3210 REM#1
3220 CLS,INPUT"ANY MORE NEW DATA (Y/N)",DB
3230 IF DB#1" THEN 2000 CLS 200
3240 REM ERASER/DELETE DATA
3250 CLS
3260 PRINT"DO YOU WANT?"
3270 PRINT"1) THE WHOLE FILE"
3280 PRINT"2) A PARTICULAR ENTRY"
3290 INPUT#I,INPUT#ENTER I OR 2#1
3300 IF I=1 AND I<2 THEN 3000
3310 IF I=1 THEN I=1,GOTO 3140
3320 REM FIND ENTRY
3330 CLS,INPUT"ENTER NAME",DB
3340 FOR D#1 TO N
3350 IF DB#1,I,11 THEN 3140
3360 NEXT I
3370 CLS,PRINT#I,"THIS ITEM IS NOT IN FILE",FOR DL=0 TO 1000,NEXT,DLTD 200
3380 CLS,PRINT#I,I,11,PRINT A#1,I,21,PRINT " VALUE: ",A#1,I
3390 PRINT#I,PRINT#I," YOU WANT TO "
3400 PRINT#I,I,11,PRINT#I," DELETE THIS ENTRY"
3410 PRINT#I,I,11,PRINT#I," EXAMINE NEXT ENTRY"
3420 PRINT#I,I,11,PRINT#I," SELECT NEW OPTION"
3430 INPUT#I,INPUT#ENTER I,2 OR 3#1
3440 IF I=1 OR I>3 THEN 3390
3450 DB = 0,BD=3340,BS=200
3460 IF DB=0 THEN I=1,GOTO 3140
3470 CLS,PRINT#2&DB,"END OF FILE",FOR DL=0 TO 400,NEXT,DLTD 200
3480 REM DELETE ENTRY
3490 IF DB=0 THEN 3390
3500 FOR J=1 TO I#1-1
3510 BD#1,I,J+1,DB#1,I,J+1,A#1,I,J+1,B#1,I,J+1,NEXT J
3520 H#1=I-1
3530 CLS,PRINT#I,"ENTRY DELETED",PRINT#I
3540 PRINT#I,"DO YOU WANT TO "
3550 PRINT#I,I,11,PRINT#I," EXAMINE NEXT ENTRY"
3560 PRINT#I,I,11,PRINT#I," SELECT NEW OPTION"
3570 INPUT#I,INPUT#ENTER I,2 OR 3#1

```

- is entered, to which the program returns when access has been granted.

The routines which handle the saving and reading of data on tape have been simplified by making the first entry in the tape file the number of records in the file; this means there is no need to use an end-of-file marker. The program pauses at the start of these routines (read or GETTMR) to be pleased to give the user time to position the tape and put the recorder in the correct mode. You could if you wish insert a MOTCHR CM command to facilitate the positioning of the tape.

The syntax of the program which performs the calculations is also very simple.

You are asked for the name of an item; if the appropriate file entry is found, then its description and value are printed and you are asked for the number of these items. The computer then calculates the value of the number of items and gives you the figure and a running total. If the name you have entered is not in the file you are informed of this and asked for another. This is important as the file entries are only checked for an exact match with the word you have entered; so if you spell the name differently, the appropriate entry will not be found.

All programs involving the use of data may proceed by protocol as set out

possible, to minimize the risk of class being lost. Every request for input should be accompanied by a clear indication of the form in which it is required, and followed by a check to see that it stays well within the required range, especially if it is to be used in an IBM 3270 statement. There are plenty of examples of how to do this; the lines 280-290 check the selection of an option from the main menu. All selections of options in this program are checked in this way, but no checks are made here on the actual class in the file. If you are writing, say, a financial program where having an initial zero by mistake would cause trouble, it is obviously worth

SUPERIOR SOFTWARE

EDIT +



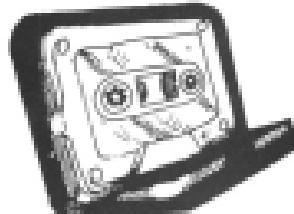
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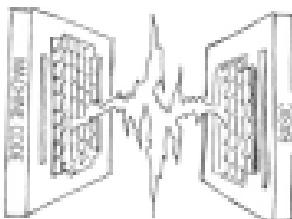
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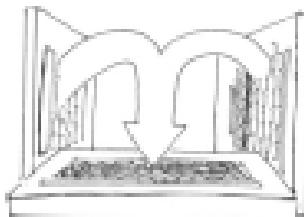
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DASM/DEMON

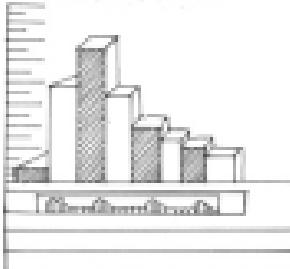


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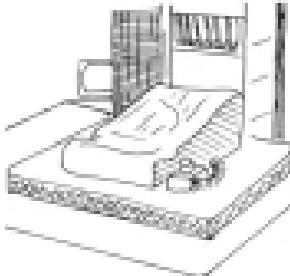
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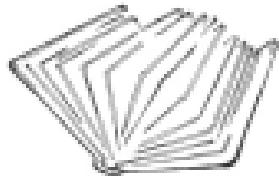
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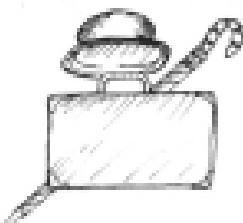
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```

3240 IF 20>1 AND 24>2 THEN 3350
3250 DH 2 GOTO 3320,200
4000 REM SAVE FILE ON TAPE
4010 CLS:PRINT "HFM TAPES IS READY, PRESS 'ENTER'":INPUT DH
4020 OPEN DH,-1,"ADOF"
4030 PRINT DH,1,4
4040 FOR DH=1 TO H
4050 PRINT DH,4,4,(1,1)PRINT DH,4,4,11,21
4060 PRINT DH,4,4,(1,1)PRINT DH,4,4,11,21
4070 CLS:DH=1
4080 GOTO 200 2000 REM CALCULATION
2000 T=CLS
5000 INPUT "NAME",PF
5020 FOR I=1 TO M
5030 IF PF=44 I,1,2 THEN S100
5040 NEXT I
5050 PRINT "THIS STEP IS NOT IN FILE":GOTO 5130
5100 PRINT#I,(1,2)PRINT "VALUES",PF$C
5110 INPUT "VALUES",T
5120 PRINT "TOTAL VALUE",T+H*W*1,1:PRINT "RUNNING TOTAL",T
5130 PRINT#I,INPUT "ANY MORE ITEMS",ITEM$C:ITEM$C
5140 IF ITEM$C="" THEN S100
      5150 GOTO 200

```

* checking that data lies within certain limits or asking for additional confirmation of very large items.

A short program like this, adapted to user needs, will deal with a wide range of menu tasks but obviously it has its limitations. If your requirements do result more complex than this it is well worth looking at some of the business programs on the market. A clear understanding of how this program operates, though, should make it much easier to get to grips with its big brother. ■

Program structure

Lines
 10-70 initialization, etc.
 100-150 load file options
 200-300 main options menu:
 300 end
 1000-1050 load file from tape
 2000-2140 enter new data
 3000-3250 examine data; delete data option
 3240-3250 delete data
 4000-4050 save file on tape
 5000-5150 calculation

Variables used

AB(I,1) name of item I
 AB(I,2) description of item I
 AB(I) value of item I
 CLS clear loop counter
 M no. of records on file
 OPT,X,Y,Z Y/N inputs
 OPT,X,Y,Z options selected
 I,J loop counters
 SS search string
 ITEM\$C name of item
 TOTAL total (in calculation)

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Recovering from i/o errors

Pam D'Arcy shows how to sort out your tapes with Tapescan

IN PRACTICALLY EVERY issue of any computer magazine we commonly read complaints about the lack of a warranty facility on the Dragon. I have not worried too much about this as there are means of recovering it. The lack of a tape catalogue facility irritates me though, again. SIGHT can be used to check that the tape content matches one's records.

My first concern is the way that everything grinds to a halt on detection of an I/O error. The biggest headache for me is that this prevents most attempts of cutting down on loading time by fast-winding tapes to an appropriate position. Small encounters on a BBC machine show that all blocks within their files are numbered, the blocks are identified as they are passed loaded and, having been informed of an I/O error, you are allowed to reposition the tape to attempt a re-read of the problem block if it occurred during loading.

The Dragon gives you no idea of how far you are through the current file, be it one being loaded or skipped, so my usual trick of "SIGHT" until the tape reaches the start of the next file may need to be typed in only a few times — or so many times that it gives up and rewind the whole tape back and start again anyway.

Having received the Dragon Data "Information for Machine Code Users" leaflet and armed with tape layout information in CoCo's Technical Reference Manual, I set about writing a tape listing program with two main criteria:

1. Recovery from I/O errors to allow faster tape positioning.
2. It should be machine coded so that it could be permanently resident in the Dragon and be used without affecting any other program currently loaded (natively, Basic).

The resulting machine code listing,

Tapescan, is published with this article. It doesn't assist with CLOAD/SIGHT and program resequence errors in that it is not intercepting any of those routines — but it is there to assist with checking the tapefile attempting other programs when you may be experiencing problems.

Tapescan can be entered directly using the COPY/PY program featured in the June issue. My initial entry took only about 20 seconds, including checking out my own coding errors.

Or you can use the Sets can loader which is also published here.

Best details of its use and technical details are below. Information on the tape formats can be ascertained from the listing.

Between files, the cassette motor is selected off for approximately three seconds. If no key is pressed in this time, the run continues; if Q is pressed, the run is terminated. Pressing any other key leaves the motor switched off until another key is pressed (Q will again quit the program, enabling tapes to be changed or the screen display to be checked).

If a read error is detected, the program resumes by hunting for a file header block. As data blocks containing binary information (eg CSAVE, CSAVEM files) are stored without inter-block gaps, obviously, depending on where within a file the P-

```
1. READ (81500000) ;C1) FROM DISK
2. READ (81500000) ;DISK
3. CLRSCREEN, 328951, PRINTER-COMPUTER.PTY
TBS=413
4. CLRPRT(1) ;SETUP PROGRAM
5. PRINT(PRINT,"TAPESCAN LOADS THE
TAPESCAN MACHINE CODE FROM
THE WHICH IS STORED NEXT ON THE
DISK WHICH ALLOWS YOU TO COPY
BOTH PROGRAMS TO ANOTHER TAPE
")
6. PRINT(PRINT,"BEFORE SAYING THE
PROGRAM, A NOTIFICATION IS
AVAILABLE TO ENABLE THE READ
TAPES TO BE POSITIONED CORRE-
CTLY BEFORE COMMENCING THE READING"
7. FOR M=1 TO 768000,NE21
8. PRINT(PRINT,LOADING TAPESCAN)
9. CLRSRVR(PRTSCAN)
10. PRINT(PRINT,"TAPESCAN LOADED")
11. CLRPRINT("TAPESCAN PROGRAM")
12. PRINT
13. PRINT(PRINT,0 TO EXIT; 0 TO R
OTATE; 1 TO POSITION TAPE PRIOR
TO SAYING PROGRAM); ELSE
ANY OTHER TO COMMENCE SAYING"
14. SLEEP(DRIVE1)P=1;"THESE"
15. SLEEP(2)*; THEN CLSND
16. SLEEP(2)*; THEN CLSND
17. SLEEP
18. IF(PRINT(PRINT,ROTATE IS NOW ON))
PRINT(PRINT,"PRESS 0 TO QUIT PROG
BASIC ELSE ANY OTHER KEY")
19. HALT; ROTATE"
20. PRINT(PRINT,"THESE"
21. SLEEP(2)*; THEN CLSND
22. CLSRVR(PRINT,"TAPESCAN PROGRAM")
```

```
23. PRINT(PRINT,"PRESS 0 TO QUIT; 0
LINE PUT READER INTO RE
CORD"; READ AND PRESS ANY OTHER KEY")
24. COMMENCE SAYING"
25. PRINT(PRINT,1, PRT,"THESES"
26. SLEEP(2)*; THEN CLSND
27. CLSRVR("TAPESCAN PROGRAM"); P
RINT(PRINT,"SAVING PROGRAM FILE"
28. CSAVE("TAPESCAN")
29. CLSRVR(TAPESCAN), PRINTER, PRINTER
30. SLEEP(2)*; THEN CLSND
31. PRINT(PRINT,"PROGRAM JUST SAY
GO"
32. PRINT(PRINT,"TAPE READER OUT
OF RECORD"; READ)
33. PRINT(PRINT,"VERIFICATION OF A
FILE REQUIRED; QUIT PROGRAM OR
VERIFY YES ELSE ANY"
34. SLEEP(2)*; THEN CLSND
35. SLEEP(2)*; THEN CLSND
36. CLSRVR("TAPESCAN PROGRAM")
37. PRINT(PRINT,"VERIFICATION OF A
FILE REQUIRED"
38. PRINT(PRINT,"TAPESCAN WILL NOW
BE ENTERED; POSITION TAPE AND
IF YOU HEAR THE MOTOR COME ON"
39. PRINT(PRINT,"PRESS 0 AT THEM C
ONCLUSION OF THE READING VERI
FICATION TO QUIT TAPESCAN PRO
GRAM"
40. FOR N=1 TO 768000
41. SLEEP
42. PRINT(PRINT,"BACK ON TAPESCAN
PRESS 0 TO QUIT; ANY OTHER TO 0
CONTINUE"
43. IF(PRINT(PRINT,"THESE"
44. SLEEP(2)*; THEN CLSND
45. SLEEP)
```


- initial error occurred, more errors may be reported before the start of the next file is detected (the important thing is that the processor keeps control).

During the "motor on" time, you can of course take the recorder out of read mode and skip along the tapes forwards backwards as desired.

The screen display is as follows: FILE-NAME — the eight-character name that the file was created with; TYPE — B (Basic), G (Data) or M (machine code) file type; ASCII FLAG — A if it is a Basic file saved in ASCII format (OS/400...) or B if it is a binary file; BLOCOR COUNT — the count of the number of DATA blocks between the

Header block and any EOF block (if any), displayed in hex. EOF FLAG — displays an upward-pointing symbol if it separates EOF block from program; ADDRESSES to all machine code lines. Insert word placed in Page.

Error codes displayed in reverse
order:

x — Error occurred (it is followed by the error code returned by the basic read subroutine displayed in hex); the only error mentioned in the gray Oregon Data leaflet is a checksum error on the block.
n — Not a Header block when expected (e.g. at the start of a run) and will undoubtedly occur when reading past blocks. Returns an I-O error if it is followed by the block.

type actually read, displayed in hex (91111111 block 100 EOT block).

B — Header block occurred before the previous file had been correctly terminated or EOP block missing, perhaps when a program had failed while writing a data file and the file was not closed.

Tapestar occupies 672 bytes of storage, including a 256-byte input buffer; thus the highest address that it can be loaded at is 32993 (hex FDD0). That is why the addresses on the simulated machine code listing part of this address. This adds as a more than useful guide when entering the program using Tracey as if you give the address as the start address for

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• writing free strings, the "free writing poems" will correspond exactly with the line of poems to be entered.

Once saved (start address 00000, length 413, entry point 0) — and the same method used with the program itself! — the program may be loaded at any time with QLOAD/M, ensuring first that there is at least 32000 memory is reserved for machine code (CLEAR 200,32000). (Should you get — shall we say — an interesting screen background to the title, you will probably find that you have failed to reserve the machine code area prior to loading).

I send a copy of Tapscott at the

beginning of all my bases for instant accessibility and load it into the Oregon every time I switch on — it saves an awful lot of trouble.

Only 440 bytes need to be saved as the remainder of the 603 bytes is the variable area.

707A	RMSI 2	DPMS, DMD
707C	RMSI 2	DPMS, DPRTY
707E	RMSI 1	DPMS, KONT
707F	RMSI 1	DPQUP
7080	RMSI 1	DPFTYPE
7081	RMSI 245	DPUFF

Even as I am writing this, my mind is working on further developments of Tapescan... How about ensuring that the

processor is currently working at the slower speed before accessing the tape for the first time? If any register is less than FF0000... is it clearing the display to a primer (should you be so lucky) just a matter of setting the "0000:0000" instructions to "JMP 0000:0000"?

Should you have found it too daunting a prospect to enter the Today code from the published listing, I am prepared to send readers a copy on cassette by return post on receipt of £1.00; for another £1, I will include Tapescan on the cassette. Post Address: Room D240, 31 Mytchett Lane, Wokingham, Berkshire, RG12 2SD. ■

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The easy way to interfacing

Follow A G Mason's instructions to build an analogue/digital interface - next month we'll show you how to use the interface to turn your Dragon into a simple storage oscilloscope.

TOP ROW		BOTTOM ROW	
Reading from right to left		Reading from right to left	
1	11. TELK	10	11. VOLP
2	BALT	11	WELL
3	HEART	12	E 13
4	G.DH	13	CART
5	2. HOLD	14	DO
6	DO	15	DO
7	DO	16	DO
8	DO	17	DO
9	DO	18	E 19
10	DO	19	AI
11	AI	20	AJ
12	AI	21	AS
13	AS	22	AS
14	AS	23	AS
15	AS	24	AS
16	AS	25	AS
17	AS	26	AS
18	CHOCO	27	AS
19	CHOCO	28	AS
20	CHOCO	29	AS
21	AS	30	AS
22	AS	31	AS
23	AS	32	AS
24	AS	33	AS
25	AS	34	AS
26	AS	35	AS
27	AS	36	AS
28	AS	37	AS
29	AS	38	AS
30	AS	39	AS
31	AS	40	AS
32	AS	41	AS
33	AS	42	AS
34	AS	43	AS
35	AS	44	AS
36	AS	45	AS
37	AS	46	AS
38	AS	47	AS
39	AS	48	AS
40	AS	49	AS
41	AS	50	AS
42	AS	51	AS
43	AS	52	AS
44	AS	53	AS
45	AS	54	AS
46	AS	55	AS
47	AS	56	AS
48	AS	57	AS
49	AS	58	AS
50	AS	59	AS
51	AS	60	AS
52	AS	61	AS
53	AS	62	AS
54	AS	63	AS
55	AS	64	AS
56	AS	65	AS
57	AS	66	AS
58	AS	67	AS
59	AS	68	AS
60	AS	69	AS
61	AS	70	AS
62	AS	71	AS
63	AS	72	AS
64	AS	73	AS
65	AS	74	AS
66	AS	75	AS
67	AS	76	AS
68	AS	77	AS
69	AS	78	AS
70	AS	79	AS
71	AS	80	AS
72	AS	81	AS
73	AS	82	AS
74	AS	83	AS
75	AS	84	AS
76	AS	85	AS
77	AS	86	AS
78	AS	87	AS
79	AS	88	AS
80	AS	89	AS
81	AS	90	AS
82	AS	91	AS
83	AS	92	AS
84	AS	93	AS
85	AS	94	AS
86	AS	95	AS
87	AS	96	AS
88	AS	97	AS
89	AS	98	AS
90	AS	99	AS
91	AS	100	AS

Diagram 1: showing the pin out of the Dragon 3 cartridge connector

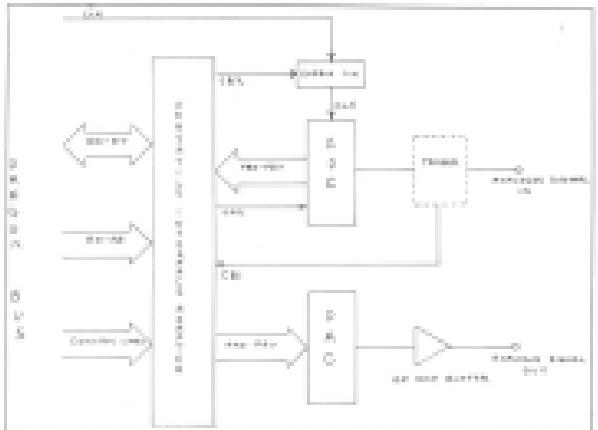


Figure 10: A grayscale digital watermark placed on a black diagram.

Apart from the purely mechanical problem of getting at the cartridge connector the address, data and control lines are addressed through this connector, insulating the **Colex** 321 is a relatively straightforward affair.

Perhaps it should be mentioned at this point that an indispensable aid to anyone wishing to interface a microcomputer to its circuit diagram. In the case of the Dragon 32, should be possible to obtain a copy from Dragon Data, Inc. The TRS-80 Color Computer Technical Reference Manual is also a veritable mine of information, much of which is applicable to the Dragon 32. Another source of useful information are the data sheets for the various integrated circuits used in the construction of the computer, e.g. the MC6809E CPU, the R406882/T406883 synchronous address multiplexer and the MC68047 Colour Video Display Generator.

The pinout of the Dragon's cartridge connector is shown in Diagram 1.

The interface used is shown as a block diagram in Figure 1 and in circuit form in Figure 2. The ZN4427 ADC and the Z8085 DAC are interfaced to the Dragon 32 with the aid of a 6522 VIA (Versatile Interface Adapter). This device, as well as providing the serial parallel data ports required by the converters, also provides the means to activate the ZN4427, synchronize the clock pulses and detect any triggering signal. Because of the compatibility compiled by the 6522 VIA anyone familiar with it is recommended to obtain the relevant data sheets.

General purpose

The ADC connected to the B port of the 6022 WA, the Farnell 274427, is an 8-bit successive approximation A-D converter. This is a good general purpose device, relatively cheap, easily obtained, and fairly fast. It has a 10 micro-second conversion time at a clock rate of two KHz. The clock signal for the 274427 is obtained from Pin 10 of the Oregon 2446A optoisolator. The clock is gated by the 274427 via a 74LS128 tri-state buffer, the purpose of which is to ensure that the incoming clock signal is asynchronous to the start of conversion pulse which is generated from the 6022 WA's CS4 control line.

The negative voltage for the ZH407 ADC can pin 14 be obtained from a TECO voltage connector IC as in the circuit illustrated; alternatively a dual voltage supply could be used. In any case it is suggested that a separate +5 Volt (AVCC) supply is used for the board rather than the rest of the system since the Dragon's F1600 has a tendency to drop its output voltage when the board is powered.

The 6222 VIA port feeds the IDAC, a Ferranti Z34400 digital-to-analogue converter, the output of which is buffered by a LM324 op-amp connected as a voltage follower.

For the hybrid construction, it is largely a matter of taste and depth of pocket how the interface is constructed. For building experimental circuits I prefer to use breadboards or plug boards. Although the initial cost of these components is quite high, this is compensated for by the ease with which complex circuiting can be put

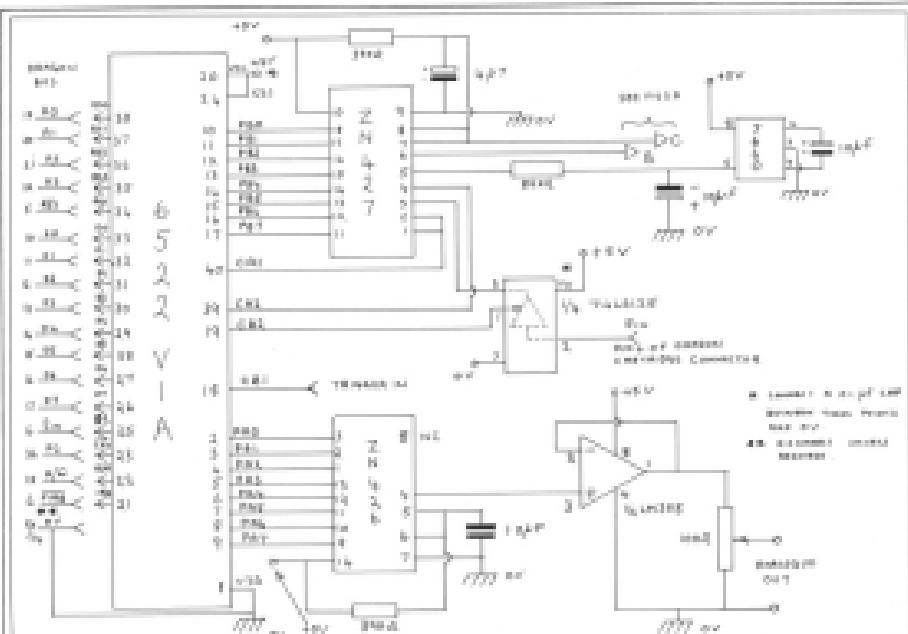


Figure 11: Amino-acid identity interface shown as a contact diagram ("Dinger") in the total energy minimized state.

■ Answers and related resources

Alternatively, the circuit can be assembled on one of the many types of Vero board available — Vero M-13 board and Vero DIP board being preferred as no track cutting is required. The DIP is very useful as it has two power rail tracks running between the IC mounting pads. Connections between the various components can be made by wire links soldered to the vero pads. Figure 10.

A criticism of this method is that it could give rise to problems due to strip capacitance, noise pick-up, etc., but for most applications this method has given good results. The primary requirement is the ability to produce a good soldered joint. If one of the wire bonds is used more than the integrated circuits should be soldered and not soldered directly to the board.

Due precautions should be observed when handling the 8000 V.L. PDRP and

234460 as these may be damaged by static electricity. The circuit should also be thoroughly checked before power is applied.

Connection

For connecting interlayer circuits to the Oregon 32, I use the method shown in Figure 4. The extension piece sets out from a double-sided printed circuit board. The tracks are formed with the aid of a conductive ink and resistive ink. The resistor is a component of the track itself. It is made of a thin film of metal (nickel-chromium) deposited on a substrate of polyimide. The resistive value of the track is determined by its width, length, and thickness. The resistive value of the track is determined by its width, length, and thickness. The resistive value of the track is determined by its width, length, and thickness.

By means of 200 x 200 x 10 mm pitch edge connectors mounted to a station cables.

Now on to programming and setting-up. An examination of the Dragon 32's memory map will show that the area FF00-FF5F (\$0000-\$003F) is reserved for input-output functions. Some of this space is occupied by the Dragon's two registers, M625021 peripheral interface schematics. However, any device having its chip enable or chip select line connected to P20 (Pin 20 of the Dragon Cartridge Connector) will be activated if any memory address in the area FF40-FF5F is accessed. In the circuit shown (see Figure 2) the \$0000 VVA has its CS# pin taken to the +5V_{DD} line, while its CS# pin is taken to P20 on the Dragon Bus; the address lines A0, A1, A2, A3 are connected to the VVA's R500, R501, R502, R503 (register select) pins respectively.

■ This, according to the author's thesis, substantiates, and thus supports, the hypothesis that the author of the book was

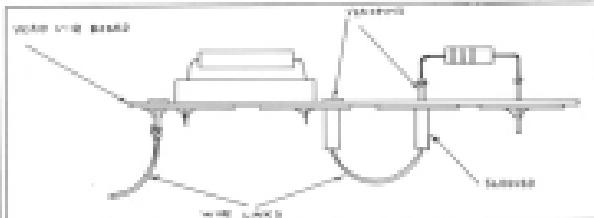


Figure 3 illustrates how can be made by using trials addressed to more girls, n^2 .



... or what's the plugcode like for you?

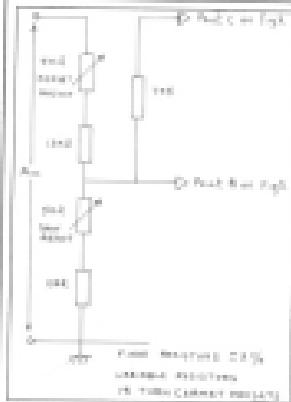


Figure 5b: posterior distribution

All the VLSI's 16-bit registers are shown in Diagram 2. Of the 16 registers a total of nine are of concern to us: 0, 1, 2, 3, 12 and 13.

First I'll look at the analogue-to-digital section. In order to operate this, the computer must perform the following actions:

Initialize the various registers of the 6502A. Normally all registers would be initialized at the start of the program, but for the purposes of explanation each register will be dealt with as it is needed. The PPS and the CMA registers must be initialized for input and output respectively. This is accomplished by writing zero to the B Port data direction register (DDRB) at FF00, and by writing FF to the A Port data direction register (DDRA) at DCA0.

Decouple the start signal to the ADC and send a start conversion pulse M8. For the Q7417 to operate correctly the clock signal must be synchronised to the start conversion pulse (see 204421 data sheet for details). One way of doing this is to decouple the clock signal within the start conversion pulse as seen on the 204421, the clock is

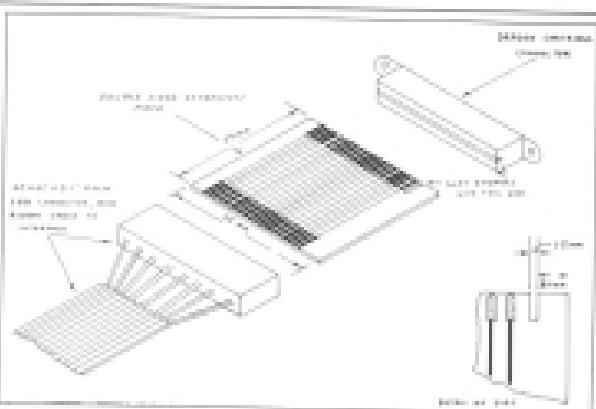
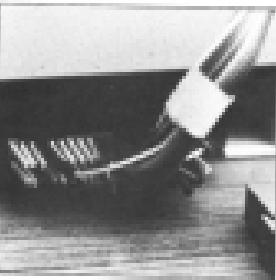


Figure 1: method for connecting multi-layer circuits to the System



[View Figure in high resolution image](#)

then re-established. Note that, except for the duration of the start conversion pulse, the WPA line of the ZH427 is left high. Referring back to the circuit diagram (Figure 2) it will be seen that the computer clock is gated to the ZH427 via a 74LS2120 inverter buffer, address enable 164 or 584 is CB3 on the VLSI. Also, the ZH427's Pin 4 (Q8), which

connected to C40 on the VLA. The four central lenses of the 48822 VLA, in C41, C42, C51 and C52, are manipulated by setting to the position of normal

Writing to the interrupt control register (PCFI) at address FF4C. The configuration of this register is shown in Diagram 3. To disable the stack CS0 is set high by writing 111 to bits 7, 6 & 5 of the PCFI. This turns off the 74LS123. CS0 is put in the enable mode by writing 101 to bits 5, 4, 2, 1. CS1 interrupt Control is set to active negative edge and CS1 to don't care.

POKE #HFFA, &HED (\$1110 1100)
And a negative going pulse one clock
cycle in length (the start conversion pulse).
It went out on CA2 by performing a write to
the VIA's C4 register (see data sheet for
the VIA2000).

ANSWER

Re-enable clock trigger The clock is re-enabled by writing 110 to bits T, 6, 5 of the PCOR, then setting C82 low and turning on bit 74.5125. At the same time CAU is turned off by writing 111 to bits 3, 2, 1. The C80 pinchange Control line [which is connected to the trigger output] is set to respond to an active negative edge.

Prestige Category	Regional Income Testing				Prestige Score	Regional Income Testing Percentage
	Low	Medium	High	Very High		
1	4	3	2	1	1000	100% Region Income Test 1
2	3	2	1	0	900	100% Region Income Test 2
3	2	1	0	0	800	100% Region Income Test 3
4	1	0	0	0	700	100% Region Income Test 4
5	0	0	0	0	600	100% Region Income Test 5
6	0	0	0	0	500	100% Region Income Test 6
7	0	0	0	0	400	100% Region Income Test 7
8	0	0	0	0	300	100% Region Income Test 8
9	0	0	0	0	200	100% Region Income Test 9
10	0	0	0	0	100	100% Region Income Test 10

Diagram 2: Assessment of the UN's capacity



Figure 2. Percentage correct response


```

18 REM :PRINT#10,0#H | 100
20 CLS PRINT#1,STR$#H(28,"E")
30 PRINT#839,"ADJUST BIPOLAR INPUT" :PRINT#870,STRING$(20," ")
40 PRINT#8453,"PRESS BREAK TO ESCAPE"
50 POKE#HFF42,0:POKE#HFF43,$HFF
60 PRINT#899,"APPLY -4.94 VOLTS TO 'A' IN"
70 PRINT#8163,"ADJUST OFFSET UNTIL READING"
80 PRINT#8227,"JUST SWIPE BETWEEN 0 AND 1"
90 POKE#HFF4C,$HFF:POKE#HFF41,0:POKE#HFF4C,$HCF:FOR J=9 TO 19:NEXT
100 PRINT#827,"READING" :PEEK#HFF40)
110 TIMER=0
120 IF TIMER<50 THEN 120
130 POKE#HFF4C,$HFF
140 PRINT#825," "
150 RB=INKEY$:IF RB==" " THEN 150 ELSE 170
160 REM#40#DJUST GRIND#E
170 FOR Z=1120 TO 1275:POKEZ,96:NEXT
180 PRINT#899,"APPLY +4.94 VOLTS TO 'A' IN"
190 PRINT#8163,"ADJUST GAIN UNTIL READING"
200 PRINT#8227,"JUST SWIPE BETWEEN 254-255"
210 POKE#HFF4C,$HFF:POKE#HFF41,0:POKE#HFF4C,$HCF:FOR J=9 TO 19:NEXT
220 PRINT#827,"READING" :PEEK#HFF40)
230 TIMER=0
240 IF TIMER<50 THEN 240
250 POKE#HFF4C,$HFF
260 PRINT#825," "
270 RB=INKEY$:IF RB==" " THEN 210 ELSE 290
280 REM#40#DJUST OFFSET#E
290 FOR Z=1120 TO 1275:POKEZ,96:NEXT
300 GOTO 60

```

Program 1 for use in setting up bipolar operation of input circuit

POKE #HFF4C,\$HCF(1100 1111)

Note that the BUSY output and the RD input lines of the ZH427 are tied together, so that the tri-state outputs of the ZH427 are automatically enabled when the data is valid. These two lines are also taken to the CA1 interrupt control line, which could be used, if desired, to generate a PIRQ via the IRQ output of the 8252, when conversion is complete. However, for the purposes of this article this is not required and the IRQ output is not connected to the computer, so CA1 is set to don't care.

Process data. After a short delay (approximately 10 micro seconds) while conversion takes place, read the A port input Register #H0 and process any data it may contain:

```

10 REM :PRINT#10,0#H | 100
20 CLS PRINT#1,STR$#H(25,"A")
30 PRINT#839,"TOPLEX OUTPUT" :PRINT#870,STRING$(20," ")
40 PRINT#865,"$HFF" :PRINT#866," "
50 FOR Z=1280 TO 1311:POKEZ,96:NEXT
60 POKE#HFF41,$HFF
70 PR INT#856,"WHEATON WHILE PR#PICK 0.40 VOLTS"
80 PR INT#8453,"PRESS BREAK TO ESCAPE"
90 TIMER=0
100 IF TIMER<300 THEN 100
110 FOR Z=1280 TO 1311:POKEZ,96:NEXT
120 POKE#HFF41,$HFF
130 PRINT#856,"WHEATON WHILE PR#PICK 2.55 VOLTS"
140 TIMER=0
150 IF TIMER<300 THEN 150
160 FOR Z=1280 TO 1311:POKEZ,96:NEXT
170 GOTO 60

```

Program 2 to be used with a Multimeter connected across the output

tiles between 0 and 1 with all other bits at 1.

4 Repeat step 3.

Note that if the analogue signal is converted directly (via a 4 kilo-ohm resistor) to pin 8 of the ZH427 then the analogue input range is between 0 volts and 2.55 volts.

Now on to digital to analogue conversion. Compared with the ZH427 ADC, interfacing the ZH428 DAC to the Dragon is quite straightforward. There are no clock signals, start conversion pulses or ideal voltage supplies to worry about. The outputs outputs data to the 8252 through the A port of the 8252. The analogue output signal is taken from pin 8 of the ZH428 and is buffered by the LM358 voltage follower. (An alternative arrangement to the LM358 buffer is shown in the Ferranti data sheet on the ZH428 series.)

If the circuit is off, apply +5VDC to the converter and OP AMP. Although not shown in the circuit diagram (Figure 2), provision should be made to switch off the DAC section of the interface if it is not required. Set the gain control to maximum and with a Voltmeter connected across the output run Program 2. Outputting zero should result in a reading of about 0.03 Volts. (This small offset voltage can be removed by using one of the circuits illustrated in the Ferranti data sheet). Outputting 256 should result in a reading of 2.55 Volts.

Next month I'll explain how this analogue/digital interface can be used to convert the Dragon into a simple storage oscilloscope. This is where the mysterious "Trigger" in Figure 2 comes in handy — all will be revealed. ■


```

310 DRA4H "BH124", 1,747+88/8
320 DRA4H "BH122",1747+88
330 COLOR1,<
340 DRA4H "BH46", 1,747+48/8 PRINT CDR, 1601, 1,1
350 DRA4H "BH124",1747+88/8
360 PRINT 1,144, 1641, 1,1
370 PSET 1,140, 160, <
380 CLR,CR,1,1 DRA4H "BH124", 1,747+88/8
390 DRA4H "BH120", 1,747+88
400 CLR,CR,1,0 DRA4H "BH96", 1,737+98/8 PRINT 1106, 1601, 1,1 DRA4H "BH124", 1,747+88/8
410 FOR I=1 TO 15259 STEP 22
420 GET X1,1333+I*20,153>,PC,<
430 PUT I,231+11420,431,PC,PRESET
440 GET X1,1351+I*20,178>,PC,<
450 PUT I,13+I*20,211,PC,PRESET
460 NEXT I
470 FOR I=1 TO 99
480 PRINP=C(1),I,I>=PC(I),I=>
490 FOR J=3TOaC(I),J>=0 HGET J
500 PRINP=C(I,J)=?1C(I,J)=PP
510 HGET J
520 2+881,Y=88
530 GET I,1,457+I*21,207,PC,<
540 SCREEN1,<
545 1#-1#HEVEA DF1B=-7 THEINSP0
550 SP1#-CH1#-1#4 THEMY=Y/221,IPY=0 THEINY=0
560 SP1#-CH1#-1#0 THEMY=Y/221,IPY=154 THEMY=154
570 SP1#-CH1#-1#1 THEINB0=221,IPX=0 THEINB=0
580 SP1#-CH1#-1#1 THEINB=222,IPX=154 THEINB=154
590 GET X1,I,Y=11+I*21,Y=211,PC,<
600 PUT I,X1,I,Y=11+I*21,Y=211,PC,PRESET:PUT I,X1,I,Y=11+I*21,Y=211,PC,PSET
610 IPUBK=C(800)=223 THEINOBUSB=50
620 IPC,PY1,PY1=1 AND PY=9 THEINOBUSB1=40
630 IPC,PY1,PY1=7 AND PY=1 THEINOBUSB1=220
640 0070545
650 IPRT=1 THEINRT=0,0070740
660 IPC,X1,O THEINCX=0/22+16,SECX=1
670 IPC,X2,O THEINY=Y/22+16,SECY=1
680 00482006,L
690 GET I,X1,I,Y=11+I*21,Y=211,PC,<
700 IPPPOINT(X1,I,Y=11+I THEINP/I,X1,I,Y=11+I*21,Y=211,PC,PSET:OLSDPUT(X1,I,Y=11+I*21,Y=211,CR,PRESET
710 PUT I,200,00=1220,200,PC,PSET
720 RT=1
730 RETURN
740 COLOR0,1,DRA4H "BH"=STR1 (8420+7,"-ENTER CR+20)
750 IPC,IX,CY>=0 THEINOBUSB=29,1#IPPPOINT(X1,I,Y=11+I*21 THEINPUT(X1,I,Y=11+I*21,Y=211,
CR,PSET:0070910) ELSE I=1,Y=21-15*21,Y=211,CR,PRESET:GOTO910
760 IPPPOINT(X1,I,Y=11+I*21,Y=211,CR,PSET
770 PUT I,X1,I,Y=11+I*21,Y=211,CR,PSET
780 QMD,0X,CY) GOTO 790,800,810,820,830,840,850,860,870,880,890,900
790 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTO910
800 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTO910
810 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
820 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTO910
830 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
840 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
850 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
860 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
870 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
880 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
890 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
900 DRA4H "BH",PAINT(X1,I,Y=101,0,0)GOTOP910
910 IPC,1,I THEINP/I=0/22+16,SECX=1
920 IPY1,O THEINP/Y=Y/22+16,SECY=1
930 IPC,IPY1,AHDCY=PY THEINP/I
940 C(IPX,PY1)=C(148,CY1+C(101,0))=0
950 PUT I,200,01=1220,201,CR,PSET
960 IPC,IPY1,AHDCY=PY AND PY=0 THEINB0=0140
970 IPC,IPY1,AHDCY=PY AND PY=1 THEINB0=01220

```

```

1080 RETURN      1090 COLOR1,0      1100 PUT 184,0,Y=11-L,0+21,Y=21),OR,PRESENT
1090 CLR1CX,CY) 10910,1090,1090,1090,1090,1090,1090,1090,1110,1120,1130
1100 DRAWB10,GOTO10
1110 DRAWB11,GOTO11
1120 DRAWB12,GOTO12
1130 DRAWB13,GOTO13
1140 DRAWB14,GOTO14
1150 DRAWB15,GOTO15
1160 DRAWB16,P4(MXT,1+L0,Y+L0),L,L,GOTOP10
1170 DRAWB17,MXT,1+L0,Y+L0),L,L,GOTOP10
1180 DRAWB18,MXT,1+L0,Y+L0),L,L,GOTOP10
1190 DRAWB19,MXT,1+L0,Y+L0),L,L,GOTOP10
1200 DRAWB19Q,"+0,0,PAINT,1+L0,Y+L0),L,L,PAINT,1X+L0,Y+L0),L,L,GOTOP10
1210 DRAWB19Q,"+0,0,PAINT,1+L0,Y+L0),L,L,PAINT,1X+L0,Y+L0),L,L,GOTOP10
1220 PFB=1000,0
1230 IPFB=---,THEM140
1240 CEP=CY-PY
1250 IPFB=---,THEMCX,CY)=S,GOTOP740
1260 IPFB=---,THEMCX,CY)=H,GOTOP740
1270 IPFB=---,THEMCX,CY)=D,GOTOP740
1280 IPFB=---,THEMCX,CY)=R,GOTOP740
1290 IPFB=---,THEMCX,CY)=G,GOTOP740
1300 GOTO1230
1300 DATA4,10,3,9,2,8,5,11,6,12,2,8,3,9,4,10

```

Circles

From Edwin And in Newcastle-upon-Tyne
THIS COLOURFUL AND short program
generates random circles of all the colours
available in high-res.

Drag

From Simon Rundell in Poole, Dorset
DRAG is a simulation of dragster racing in
PMODE 3. Use of the joystick is not
needed if you put them in to give you a
feeling of actually racing if you feel that this is
not necessary simply delete lines 50 to
60.

The race is calculated on the speeds
reached after every 20th of a mile. This is
displayed in text and then you are returned

```

10 PMODE 3,1;SCREEN 1,1: 30 FOR B=1 TO 5;CIRCLE
PCLS
20 X=RND(250);Y=RND(190);S=RND(150)
30 SOUND8,1:NEXT
40 GOTO 20

```

to hi-res. There is the added danger of
blowing a tyre. This kills you but you are
still free to compete in the next race.

Program notes

1-8	Twiddley bits	48-57
9-10	Instructions (if required)	58-105
20-25	Sets all variables required and a few more besides	
26-36	Draws the cars — OEMs have into an array and draws the tire with animation tool	109-114
37-46	Draws the arena and all parts but do not need to be redrawn every time	

The main part — draws every-
thing. PUTs it all — checks if a
tyre has burst or if it is time to
move the speeds.

The text screen showing of all
speeds, times, distances, and
the current world record for
the class.

Relays the bad news to you
that one of the cars has blown
up — and then carries on
regardless.

The program, once set, will run and run
and run, till you干预止它.

```

1 REMXXXXXXXXXXXXXXXXXXXXXX
2 REM      S R A G
3 REMXXXXXXXXXXXXXXXXXXXXXX
4 REM BY SIMON RUNDELL
5 REMXXXXXXXXXXXXXXXXXXXXXX
6 REM 101 RUNDDELL@PCTP.IPSI
7 REM      4TH SEPT 1982...
8 REMXXXXXXXXXXXXXXXXXXXXXX
9 REM?PRINT"DO YOU WANT TO KNOW ABOUT"
10 INPUT$A$IF A$="Y" THEN 12
11 IF A$=""THEN 20
12 CLS?PRINT"YES A GAME FOR THE DRAGSTER"

```

THE GAME 17,750

BY SIMON RUNDELL..

Continued on
page 58

OPERATION GREMLIN . . .

A very different game that combines the thrills of adventure with the fast fire, machine code speed of arcade action. The player must control not one, but three different troopers, each with their own character status, in the search for the weapons that will destroy THE GREMLIN.

DRAGON TREK

Dragon Trek is a new implementation of a classic game, taking full advantage of the Gradius II's graphics and sound capabilities. Your ship's impressive armament is comprised of high energy Photon Torpedoes and Phasers. Both long and short range armaments (in full graphics) enable you to track the Kilogram and your onboard computer will give you extra tactical facilities. As commander you will have to use strategy and cunning to extract the money.

THE RING OF DARKNESS

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THE RING OF DARKNESS is a complete role playing adventure in 32k graphics, featuring a detailed land filled with towns, 30 dungeons, forests and seas, and populated by kings, princesses, evil rangers and other strange creatures. All monsters are identified with respect to the adventure. The Orc version is restricted to first mode only. Many hours of mystery and suspense await you in your quest to find The Ring Of Darkness.

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```

2-4, 1921, PRESET; LINE 192-3, 1920-192-3, 1921, PRESET
40 PRESET;TYPE BURSTBEEBE
41 IF PWD=1921 THEN 48 ELSE 72
42 IF PWD=1921 THEN PUT(LA,LB=LA+3D,LB+3D),A,PRESET 198="BLUE";ELSE PUT(LA,RB=DR
43, RB=DR),B,PRET;B="YELLOW"
44 PAINT(128,0),2,2
45 FOR ANLTO1000:DATA
46 GOSUB109
47 REM-----MOVEMENTS-----E
48 IF 01=14 AND 13=12 THEN 01=128
49 IF 02=02 AND 13=12 THEN 02=229
50 L=0M+128, M=1-128,W,PSET;LINE 022,W=01-128,U=02,PRESET
51 L=0M+128,W=1-128,W,PSET;LINE 025,W=01-128,U=02,PRESET
52 U=0M+17 IF U>128 THEN U=0M+128;DIST=100
53 W=0M+17 IF W>128 THEN W=0M+128;DIST=100
54 GOTO 48
55 REM-----SOUND-----E
56 REM-----SOUND-----E
57 REM-----SOUND-----E
58 REM-----SOUND-----E
59 REM-----SOUND-----E
60 REM-----SOUND-----E
61 PRESET;TYPE BURSTBEEBE
62 PAINT(128,191,2,2
63 LINE(128,105-128,105),PSET
64 READLN(BMW)
65 IF LEADER THEN W=01+1 ELSE W=02+1
66 FOR MAH=1 TO 200:HEAT
67 RESTORE:GOTO 63
68 REM-----SOUND-----E
69 REM-----SOUND-----E
70 REM-----SOUND-----E
71 IF BOM=192-193 THEN 04=04-192-193 ELSE BOM=192-193
72 CLBPRTB,"" BOM CAR MEMO":193
73 PRINTB02,"SPEED":193"K.P.H"
74 PRINTB04,"TIME":193"MM:SS.SEC."
75 PRINTB05,"DISTANCE":193"MM LEFT"
76 IF LEADER THEN PRINTB02," Leader"
77 PRINTB03,"" ON 1 line per WINTEL:192
78 PRINTB05,"SPEED":193"K.P.H"
79 PRINTB02,"TIME":193"MM:SS.SEC."
80 PRINTB05,"DISTANCE":193"MM LEFT"
81 IF 04>195 THEN H=03:W="BLUE"
82 IF 04<195 THEN H=04:W="YELLOW"
83 IF 04=195 THEN PRINTB04," Leader"
84 PRINTB04,"User is racing":193:BY 193
85 BOM=192-193:MEMO=193:THEN LEAD=193/20
86 IF LEAD>193-1 THEN LEAD=193/20
87 FOR ANLTO1000:HEAT
88 PROSES,SCREEN,1,RETURN
89 PRESET;TYPE BURSTBEEBE
100 CLR
101 PRINTB02,"A TRAGEDY HAS OCCURRED-ONE OF THE TYRES ON THE 1981 CAR EXPLODED
102 SHATTERED THE CAB AND KILLING THE DRIVER INSTANTLY"
103 PRINTB02,YET, IN HIS MEMORY HIS CREW WILL RACE ON.....LET US RACE AGAIN!"
104 PRINTB02,PROSES,1,RETURN
105 FOR ANLTO1000:HEAT

```

Weaving

From C. Evans in Swaziland
 WHEN THE National Exhibition was held in Swaziland in August 1982, I wanted to produce a program to be used in the technology exhibition, and which would

feature the recently launched Dragon 32. The program described here is an extensively revised version of the one which was actually used in the exhibition.

The traditional weaving motifs of Swaziland are a great attraction to tourists, and a large number of interesting patterns can be woven on the old looms (although the designers tend to choose from a rather restricted set). In fact, a huge variety of patterns can be generated simply by

assigning a value to a binary number of length 216, so that half of the bits are equal to one, and half are equal to zero. Write this number down 216 times, to form a 216 x 216 square, and then complement all the bits in the 11th row whenever the 11th bit of the original number was a zero. Outside this basic square, repeat the pattern in both directions by reflection.

Each zero or one represents an element of the pattern, with four horizontal +

and four vertical threads; two of each may be thought of as background colours and two as foreground or contrast. A step in the pattern represents a background element, and this is obtained by bringing the four background threads to the top and weaving them with each other, while the contrast threads are woven together separately underneath.

Consequently, a zero in the pattern means that the four contrast threads are brought to the top. The practical importance of this technique is that it allows large blocks of solid colours to be produced without the threads which are being used having to

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The simplest patterns use one background and one contrast colour to produce a two-colour result. More complicated patterns use a different contrast colour over the middle half of the pattern (in one direction or both). The colours are chosen from the set green, yellow, blue and red. It would be a simple matter to change the SCREEND statement, and use the colour codes 5, 6, 7 and 8 instead, but if it's completely free choice from all eight colours is required, the program would have to be rewritten for the localisation.

Two sizes of pattern are allowed here. Other sizes could be programmed, but it would not be as easy to fit copies of them on to the screen. The randomly-generated option conveniently produces a very simple pattern, using a set of rules which one should not have expected to be any good. If you wish to make a more of the data for generating a particular pattern, the last few statements of the program enable the data to be listed. The `PRINT` messages have been arranged to appear on the 20-column Dragon display without any breaks in the output. This makes them look a little odd in the listing.

110 PRACTICE SHOULD TAKE THIS PATTERN IN FOUR COLOURS. THE
BACKGROUND COLOR IS USUALLY THE SAME FOR THE HORIZONTAL AND THE
VERTICAL. THOUGH, NOT NECESSARILY DIFFERENT [P]
110 PRACTICE, ANY OF THE CONTRAST COLOURS MAY USE THESE 2
110 SAME COLOURS. EACH ONE USED FOR A TWO- COLOUR PATTERN. ALSO
110 FROM THE SET NUMBER, 20000, THREE, 4, 600.
110 PRACTICE PATTERN MAY BE MADE IN TWO SIZES, OR YOU WANT TO
110 MAKE SMALL.
110 INPUT 1a
110 IF LENGTH(1,1)=** THEN READ 1000 END
110 PRACTICE YOU WANT A THREE PATTERN?
110 INPUT 1b
110 IF LENGTH(1,1)=** THEN 200
110 PRACTICE INPUT 3 COLOURS OR 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,
110 16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,
110 41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,
110 66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,80,91,
110 93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,
110 115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,
110 136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,
110 159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,
110 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Store print utility

From John Ramey in Dixie
WHICH investigating the contents of slots,
or developing machine-code programs, I
often find this utility program useful.

displays or sends to the printer the displays of a range of systems both in page-detailed and character form.

destination and set up using INPUTS. Destination is limited to whether the key number is present or not.

The loop controlling each line output is in lines 130 to 360. Within this PORN-MEXT loop, there are here more FOR-NEXT loops. The first goes the contents of eight bytes in hexadecimial (memory two bytes), and the second goes the contents of the same eight bytes in character form.

- 28 • Print stage is measured
- 29 • and characters either to
- 30 • the screen or to a printer.
- 31 •
- 32 • *e. John Barnes, 2000*

60
70 CJSWENTOGO
80 THAT "SHOULD" BE
90 IF AND THEN DO
100 CJSWENTOGO

```

110 INPUT "SEARCHFOR, PRINTIT?"; S
120 IF C00 AND C02 THEN 100
130 FOR I=6 TO 8 STEP 2
140 PRINT A-L,M,N,D(I),";"
150 FOR M=6 TO ?
160 IF M>D(I) OR D(I)=M THEN PRINT A-L,M,N,D(I)
170 PRINT A-L,M,N,D(I)
180 IF M>D(I) THEN PRINT A-L," ";
190 NEXT I

```

```

200 PRINT B-C, " "
200 IF C>D THEN PRINT B-C, " "
200 FOR I= 0 TO 7
200 IF B(I)=D(I) OR B(I)<=D(I) THEN PRINT B-C, " "
200 ELSE PRINT B-C, D(I)-B(I), "+"
200 NEXT I
200 PRINT B-C
200 NEXT I
200 END

```

Drawing

Open Access Library in Mathematics

THIS program is designed to let the user get to grips with the Dragon 32's DMA command and to help him design and construct longer and more complex instruction combinations.

The program places the instructions in an order so that they can be easily

repeated. If you run out of space for your instructions simply change the `Dim` statement in line 40 and extend the loops etc where appropriate. The program has elementary error checking for typing mistakes but this will not deal with syntax-type errors like 40 instead of `GoSub`.

If you've got a technical question or problem write to Brian Cadogan, Dragon Answers, Dragon Gates, 10213 Little Newport Street, London WC2R 3LD.

Dragon Answers

Interfacing recorders

I AM having difficulty in deciding what the pins are for the tape socket. I tried to wire up a 5-pin DIN plug to two 3mm diameter Jack plugs (ear and mouth) with no success. Can you help?

M. Cawood,
Lichfield
Staffordshire

YET ANOTHER letter about the cassette interface! There have been many people asking for a recommended cassette recorder in details of the specific model for connecting special recorders — even need to read recorders in my case!

The connection is via a standard 8-pin DIN plug which is easily obtainable. The pin connections are as follows:

- Pin 1 — Remote control (far speaker out).
- Pin 2 — Ground (joined to one connection for both Far and Near).
- Pin 3 — Remote control.
- Pin 4 — Cassette input.
- Pin 5 — Cassette output.

As both input and output are the same common ground connection, some recorders will cause feedback if both Far and Near leads are plugged in together. To avoid this, have only one of these plugged in at any one time.

Printing cheaply

I WOULD like to add a printer to my set-up, but I cannot afford or justify something like an Epson. The obvious choice would be an Apple IIe at £30 plus I still find the price rather high.

I was wondering, is it possible to run the Sinclair printer on my Dragon? I know the plug won't fit the socket on my computer, but could you tell me, if it is possible, what adaptors or leads I will need, where can I get them and how much should I expect to pay for them?

A. McNeely,
Wigan

A LOT of readers seem to want to run a Sinclair printer from their Dragons, the great advantage of this little printer being, of course, its cost. The disadvantage, however, is that it won't connect directly with my



machine other than Sinclair.

What is needed is a special interface which will convert the ASCII codes from the Dragon's printer output to the dot arrangements for the EP printer. At least, a company is producing just such an interface — PrintMaster II is available for £29.95 from Microtastic Computer Systems Ltd, 16 Upolland Road, London SE17 (phone 01-865 1131), this will give you a 43-character line output, as well as the usual seven graphics that the printer offers.

Proper timing

WHAT IS the proper way of using the Dragon's timer for achieving a delay? I have tried the following which seems to work, but is there a better way?

10 TMR0=0
20 TMR1=0
30 P1=7 THTR (FUNCTION)
40 GOTO 20

This produces a delay of 10 to 11 seconds if I = 500.

Is there an accurate figure as to how many times the timer "pulses" per second?

G. Barnes,
Preston
Lancs

THE BEST obvious use for the Timer function is for timing, rather than for creating delays. The timer value is updated by the interrupt routine, which occurs exactly 50 times a second. Therefore, to get the time in seconds use TMR0/50. As the maximum value of Timer is 65535, this gives accurate values for up to 21 minutes before looping around to zero again, but you won't want 21-minute delay loops anyway!

A few words on how to do it in

good was of using the timer for a delay. It is the number of seconds which the program spends for.

10 TIMER = 0
20 IF TIMER < 5 - 50 THEN 20
30 End of program

Lower case

I AM writing a certain application program in which it would be desirable to force lower case characters input. I wondered if there was some way in which Shift could be achieved from within a program without manual intervention? At present I use PRDY8 and PRDL8 to lower case.

A. Brown,
Portsmouth
Hants

AS SHIFT is supposed to generate the ASCII code 16, the obvious answer would be to use TMR0/16 to sample between upper and lower case. Unfortunately, this doesn't work, of course. There is a simple P028 which can be used to control right-left — logic 0/1. Use the following in your program:

```
PO28=0, 100 for upper case  
PO28=1 for lower case
```

If you pick any other number (1-254) in this address, you effectively disable lower case only.

Scrolling sideways

I WOULD like to know if it is possible to make everything on the high resolution screen scroll sideways, and if so, how?

I have tried short machine-code subroutines to do this with the text screen, and to 40x20 the hires screen up and down, but

never from side to side. This would help me greatly in the programming of my Dragon.

T. Honey,
Dartford
Kent

Birmingham

IF YOU want to scroll to the left, the only way to scroll the hi-res screen sideways is to put the whole screen in an array and use SET and PUT to move it around, for example:

10 PMODE 4, 1:COLIN 0.1,POLSCREEN 1,1
20 LNS(0,0)-(255,199),PUT,8
30 088 A1200 GDT(0,0)-(254,199),A,8
40 PUT(1,0)-(255,199),A,PUT
50 GDT(0,0)

If you try this you will see that it does work, but it is rather slow. You could speed it up by not scrolling the whole screen, or scrolling more than you need at a time. For most purposes this should be good enough, if, however, it is still not fast enough then you will have to do this in machine code.

No joy on games

I HAVE a Dragon 32 and I am trying to write my own games, but I can't do so with joystick. I know the bit about A-JOYSTICK, 0's on (0) or (1), but I can't figure out how to use it.

Could you please tell me how it's done?

John Corrie
London NW7

AS THE Dragon hasn't manual mode such a mess of logic to explain the use of the JOYSTICK command, it's not surprising that you are confused.

The command A-JOYSTICK will give A a value of between 0 and 63, n=0 for the left-right of the R/B/T joystick and n=1 for the up-down of the R/B/T joystick, similarly n=2 and 3 for the U/D joystick, A value of 0 indicates for left or all the way up, and a value of 63 indicates for right or all the way down.

A further complication is that the values of the joystick readings are only updated when it is a raw, therefore sometimes you will need to put the value of JOYSTICK into a dummy subroutine just to get the correct reading for the other values.

There is no command for reading the fire button, this is done with P028=0/255 and is quite simple.

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Competition Corner

Answers to Competition Corner,
Dragon User, 12/13, Little Newport
Street, London WC2H 3UD

Adding sound and speech

A double chance to win a double prize from JCB Microsystems — if you can solve Gordon Lee's puzzle

A NUMBER OF readers whose is having had difficulty with the puzzle in the September edition of Dragon User. You may recall that the question involved two mathematicians, Sam and Paul, who had been given respectively, the sum and the product obtained from a throw of three dice.

After some time Paul, who had been given the product, stated that at least he could only narrow it down to one of two possibilities. When asked Sam, who had the sum, declared that he had narrowed it to three possibilities, but how he knew the values of the dice thrown.

Many readers tried to solve the puzzle by working out which dice throws could result in a sum obtainable in only three ways, and then tried to find the correct throw by relating these possibilities with the information given about the products. This failed to provide a unique answer. For odds like these do you think it's going to be that easy!

Products ...

How is Peter fit done. With three dice there are thirteen possible sums, ranging from three (three ones) to 18 (three sixes), and products from one (three ones) to 216 (three sixes). In the case of the sums it can readily be seen that, with the exception of the very lowest and highest scores, there are many different possibilities. From this it would seem that Sam, who was given the sum, was at a disadvantage. That was not so — as my shell shows.

Consider first the case of the products. First, run through all possible throws of three dice, counting the number of times that each different product is arrived at. This can be done with a simple program using the array (See Pg 216). If the throw are generated in three FORNEXT loops A, B, and C, then $P = A \times B \times C$. $P(0) = P(0) + 1$ will do this. When generating the throws, if A is always taken as the largest value shown on the dice, and C the smallest, it will eliminate problems caused by duplication of throws. For instance, the throw of two, four and six in any order is only counted the once.

Now, as Paul is unable to provide an answer there must be more than one set of dice throws that can form that product. And the computer is just out these values:

FOR N = 1 TO 216 IF P(N) > 1 THEN

While all this has been happening, we assume that Sam, realising that the sum that he has been given is not much use on its own, would be preparing such a table, since he might reasonably suppose that as Paul did not immediately come up with an answer, there must be more than one possibility open to someone who only knows the product.

Sam would then compare his sum with the values on the table. Thereafter, once Paul announces that he has narrowed it down to two possibilities, only if Sam's sum had 11 would he be able to make the statement: "I have reduced it to three possibilities, but now I can eliminate all but the correct one." The important clue that many readers missed was that Sam's statement was not made until Paul had made his, and it was made on the strength of Sam having prepared the table of values and not solely on the sum that he had been given. Therefore the three dice thrown were 4,4, and 3.

I hope that's put paid to readers' minds at rest. And in case any readers are also wondering why no winner is announced this month, the answer to that is simple. Because of Christmas the issue of the magazine had to be put together earlier than usual, before all the competition entries had come in. So you'll have to wait for the next issue to find out who's won the Dragon 64 — and how. In the meantime here's the latest competition, which makes the most of a traditional February event.

... and pennies

There was an unusual game at the Youth Club Valentine's Day Dance. The prizes were "penny" cheeses, and the object was to win as many as possible. First of all some slips of paper were numbered consecutively from 1 to 200 and each player was invited to choose one of these slips. The players had then to line up in front of a table on which was the box of cheeses and a card with these instructions on it:

TAKE A PENNY CHEESE.
IF THIS NUMBER ON YOUR SLIP OF PAPER CONTAINS AT LEAST ONE SEVEN, THEN ADD 7, OTHERWISE SUBTRACT 10.
IF YOUR NUMBER FALLS TO LESS THAN 1 YOU MUST RETIRE FROM THE GAME.

GO TO THE BACK OF THE QUEUE AND WAIT FOR YOUR NEXT TURN.

The game continued until all the players had been eliminated. The following statements were overheard: Annabel: "I had the maximum possible number of events" — Bryan: "Both Jane and I had 12 events each" — Christine: "I had eight events less than Annabel" — Daniel: "The number of events I received was the same as the number on my paper at the start of the game, but with the figures reversed". However, one of the statements was incorrect. Who reader A, and what numbers did the others start the game with?

Prizes

THIS MONTH there are two sets of prizes to be won — so we're looking for two winners. Each will receive a package of software from JCB Microsystems, of Bournemouth consisting of its Sound Extension Module, Speech Synthesis Module, the arcade game Rail Gun Ballooning and Mass Invader, a utilities program which speeds up Basic by stripping out REM statements, etc.

Rules

TO WIN the package of software you have to send in the most elegant solution to the puzzle. You must prove both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. As a reminder, complete the following sentence in 10 words or less: "I want to add speech and sound to my Dragon because..."

Your entry must arrive at Dragon User by the last working day in February 1984. The names of the winners, and the solution to the puzzle, will be published in our May issue. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the final result.

PRIZE N. NEXT N

From this we can see that Paul must have been given either 4, 8, 12, 16, 18, 24, 32, 36, 48, 60, or 72 as the product.

The next step is to modify the program to print out the dice values for these products. The results should be listed in table form.

Product	Values of the dice
4	2,2,1 (0)
8	2,2,1 (0)
12	2,2,2 (0)
16	2,2,2 (1)
18	2,2,2 (1)
24	2,2,3 (0)
32	2,2,3 (0)
36	2,2,3 (0)
48	2,2,3 (1)
60	2,2,4 (0)
72	2,2,4 (0)

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